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Contents:

	PAGE
Our Home Market	181
Electricity in Food Preparation	182
Results of Farm Electrification	182
Reasonable Charges for Electricity	182
American and Continental Electrical Relations	182
A Modern X-Ray Installation *(illus.)*	183
Standardisation in Industry	185
Long-distance Telephone Cables, by A. Engelhardt and H. C. Turner *(illus.)*	186
Small Motors as Household Helps, by A. H. Avery	189
An Unusual Lighting Installation *(illus.)*	191
Reviews	192
Business and Industrial Notes	193
Lighting and Power Notes	197
Tramway and Railway Notes	199
Telegraph and Telephone Notes	199
Radio Notes	200
Contract Information	200
Legal	201
Notes	202
Our Personal Column	204
Financial Section—	
New Companies Registered	205
Financial Section—*contd.*	
Official Returns of Electrical Companies	205
City Notes	206
Stocks and Shares	207
Indian Electrical Imports	209
Danish Trade and Industry	209
The Hydro-electric Power Commission of Ontario	210
City Refuse Disposal, by C. L. O'Shaughnessy	211
The E.A.W. Conference	212
Silver Plating Solutions	214
The International Lighthouse Conference	215
New Electrical Devices, Fittings, and Plant *(illus.)*	216
Parliamentary News	217
Correspondence—	
The Battersea Power Station	218
The E.S.C.A. and Whitleyism	218
Salesmanship	218
Electromagnets on Ships	218
The Inspection of Installations	219
Published Specifications	219
Trade Mark Applications	219
New Work for Contractors	220

Our Home Market.

THE leading article in last week's issue was devoted to a survey of some recent developments designed to stimulate our overseas trade. Some figures published in the *Board of Trade Journal* now lead us to return to the most important market of all—that of Great Britain herself.

When reviewing the statistics of our foreign electrical trade month by month we have pointed to the great growth of imports relative to our exports. The B.O.T. figures referred to look back over a period of five years and illustrate this tendency in rather a startling way. They compare the trade during the first half of this year with the corresponding period of 1924; they give actual values and also calculate from the 1929 volume the value in terms of the 1924 price level. The results are as follows:—Retained imports of electrical goods and apparatus rose from £1,292,000 to £2,479,000, equivalent in 1924 values to £3,051,000. Exports increased from £4,760,000 to £6,128,000, or, at the 1924 valuation, to £6,597,000. Worked out in another way with an index of 100 for 1924, the volume of imports rose to 236.1, while that of exports rose to 138.6.

Leaving aside the export position, which may or may not be satisfactory, according to the growth of the world demand which is an unknown quantity, the question of imports deserves careful consideration. It is safe to say, we think, that the British electrical industry is fully capable of supplying all our home needs, and there appears to be a large volume of trade going abroad which should be confined to this country to the advantage of the electrical industry and of the nation at large. It seems absurd that foreigners should reap so much advantage from the enormous amount of electrical development which is now taking place here. What are the reasons for this desire on the part of British consumers to go abroad for their electrical requirements? (It should be remembered that the trade with which we are dealing excludes electrical machinery, which is another matter, although cables are included.) We think that the argument often used against the industry in its foreign dealings, that its products are not suited to the market, cannot be advanced here. Again, British electrical goods are as extensively advertised as foreign products, and the selling of them is as

efficiently carried out. It is most remarkable that there should be such a large volume of electrical imports in face of the national desire to buy British products. In general, the quality of British electrical apparatus is superior to that of foreign makes. We are consequently compelled to return to the question of price. Upon this we can say at once that generally if a foreign product sold here is of a quality equal to its British equivalent its price is about the same. Unfortunately, there are many consumers—trade and public—who go for cheapness. The trade is careless of, and the public ignorant of, the results which are likely to ensue from the use of shoddy materials or appliances. Fortunately, among the main objects of some of our leading electrical bodies—particularly the E.C.A. and the National Register—is the inculcation of a sense of responsibility in the industry, an endeavour to teach that only sound materials and accessories are good enough. The trade, in its turn, must educate the public to the fact that when their installations are carried out on safe and troubleless lines they must not purchase cheap, unsafe and unreliable apparatus to connect to those installations.

In all electrical propaganda a corner should be found for the slogan, "Buy British goods."

Electricity in Food Preparation.

The endeavour to stimulate what may be termed the domestic uses of electricity, more particularly for cooking and heating purposes, is becoming quite general (we wish we could use the word "universal"). That its applications in the home are many and varied is very well known, but it is not perhaps generally realised that equally diverse opportunities offer themselves in connection with the wholesale preparation and cooking of food in establishments which cater for the public at large.

That is a sphere which must not be neglected, and in seeking to encourage the utilisation of electricity therein something may sometimes be learned from the methods of others. For instance, for the past two or three years the Compagnie Parisienne de Distribution d'Electricité has been engaged on a campaign to popularise the use of electricity for food preparation purposes by bakers, confectioners, cooked-meat vendors, and in restaurants, hotels, &c. At first progress was slow, but it would appear that as a result of the Company's persistence its efforts are now beginning to meet with a considerable measure of success. Evidence of this is afforded by the fact that, whereas in the above-indicated classes there were in 1927 only 59 establishments in the Paris district in which electric cooking had been adopted, the number rose during last year to 113, the total being made up of 47 restaurants and hotels, 35 bakers and confectioners, and 31 cooked-meat establishments, the whole representing an aggregate installed stove capacity of 1,012 kW. In the case of hotels and restaurants, the electrical installations are mainly to be found in new establishments, the proprietors of but few of the older ones having as yet been induced to discard their existing cooking equipment. As regards bakers and confectioners, the same difficulty of competing with existing permanently-constructed coal-fired ovens has been experienced, the electrical installations mainly representing extensions of, rather than substitutions for, existing equipment. Chief success in the change-over to electric cooking has been achieved among the tradesmen specialising in cooked meats, the most popular types of oven for this purpose having a capacity of from 10 to 12 kW.

Two tariff scales for the supply of electric power for cooking purposes are in operation in Paris. Under one scale the standard rate is charged, it being, however, subject to a sliding scale of reduction in accordance with the total quantity used; under the second scale, different prices are charged for day, night, and peak-hour consumption.

Results of Farm Electrification.

Any record of actual experience in the use of electricity on farms worked for commercial purposes is most acceptable. The most recent investigation into the subject, made by the Institute for Research in Agricultural Engineering of Oxford University, has now been published and is reviewed in this issue. This publication deals chiefly with results obtained on eight farms in Cheshire and contains much useful data. The most important of the conclusions reached is that the farmhouse requires more electricity than the dairy or barn, including thrashing. Although the dairy load has its peak in June, it is not large enough to affect greatly the total peak which comes in the winter. No results are available as to field work, which would take by far the greatest proportion of energy used on a farm; and, no doubt, electricity must prove its practical economy in other spheres before it will be given much opportunity to prove its utility in major operations, such as ploughing.

Perhaps the chief points to be emphasised at this stage are that (1) though a low cost of overhead construction is very desirable, it is still more desirable to secure a load that will pay for a sound construction; (2) the farmer should be weaned from his present tendency to regard electricity as little more than a convenient method of lighting to a consideration of its economic value for other purposes; and (3) the necessity of giving full instruction in the use of electrical apparatus and of keeping in touch with the consumer after connection. The importance of the last two points were well illustrated in the paper recently read by Mrs. Van Waveren at Newcastle (Electrical Review, July 26th, 1929).

Reasonable Charges for Electricity.

At the lunch following the opening ceremony of the E.A.W. Conference at Newcastle, Mr. L. L. Robinson threw out the suggestion—reported elsewhere in this issue—that a two-rate, rather than a two-part, tariff might enable the lowest charge to be made to domestic consumers. He stated that, in the case of the Hackney undertaking, if the charge for two hours per day were raised to eightpence, the charge for the other 22 hours could be reduced to less than one halfpenny. The long-hour rate is one that—whatever the type of tariff may be—begins to approach the figure that will be necessary if all-electric homes are to become general. It is, of course, quite true to say that, at a higher charge, the cleanliness, comfort, and labour-saving qualities of electricity make its adoption well worth while even for general heating and water heating; but this argument cannot carry weight with the millions of householders whose means do not permit them to save the labour which they themselves must provide. We hope Mr. Robinson's suggestion will arouse a due amount of interest among supply engineers and that he will later find himself in a position to develop his theme.

American and Continental Electrical Relations.

One of the most interesting of recent rumours of electrical amalgamations comes from Berlin. It is to the effect that negotiations are well advanced, but not yet completed, for bringing about a close working association between two great rival concerns, namely, the General Electric Company and the Allgemeine Elektricitäts Gesellschaft. Understandings concerning certain matters have, of course, existed for a long time past, and, as we have already recorded, the G.E.C. acquired some 16 per cent. of the shares of the Osram Company (which is connected with the A.E.G., Siemens & Halske, and others). A second Berlin dispatch states that during the past few months the General Electric Co. has quietly been acquiring A.E.G. shares to a value estimated to be between £1,250,000 and £1,500,000. An increase of capital of the A.E.G. is contemplated, the G.E.C. subscribing for a large part of it. The final details of the transaction should be received shortly.

A Modern X-Ray Installation.

Brief details of the equipment at the Brompton Hospital, London, which was carried out by X-Rays, Ltd., and is a typical example of the up-to-date layout of radiological plant.

IN contrast with the old working distance of the order of 40 in. and exposures of several minutes' duration, which were necessitated by the small power available, modern X-ray tubes and high-voltage transformers render excellent photographic definition possible with a tube-film distance of 6 ft. and over and a fraction of a second's exposure.

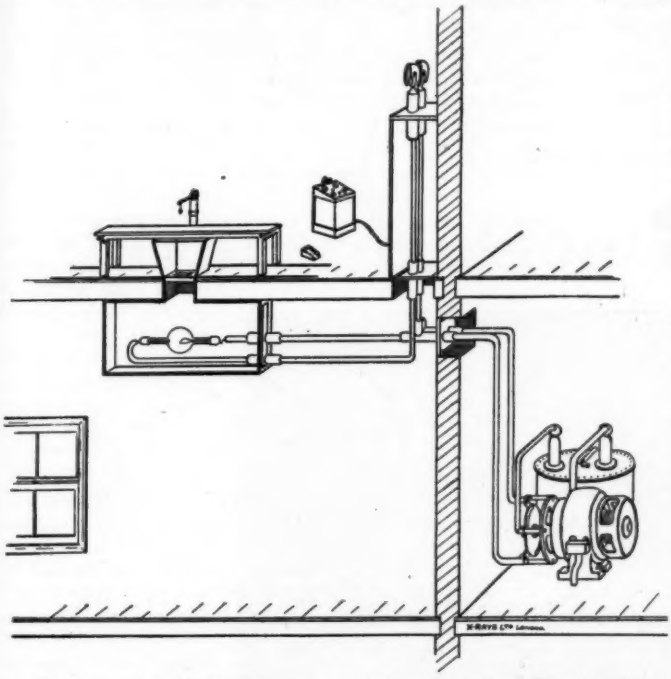


Fig. 1.—Sectional Diagram: Arrangement of Equipment.

Consequently there is a distinct tendency to divide modern installations into two parts, so as to house the e.h.p. generating equipment in what is, in effect, a sub-station, only the X-ray tube itself being actually employed near to the patient undergoing examination or treatment. Two of the definite advantages of "tele-radiography," as such relatively long-distance radiography may be termed, are, first, safety (as the patient is removed from possible risk of contact with the e.h.p. conductors) and, secondly, sharper definition in the radiograph (as geometrical optics indicate that the minimum distortion of the image will obtain when the source of X-rays is at an infinite distance from the subject).

In this connection the re-equipment of the Radiological Department of the Brompton Chest Hospital, London, by Messrs. X-Rays, Ltd., proved to be somewhat of an event, for it has been repeatedly stated that for the class of work that is being undertaken, no other hospital in the world has a similar department so completely equipped. The accompanying sectional diagram (fig. 1) indicates the approximate relative positions of the power transformer and rectifier, the X-ray tube and patient's couch, and control desk as arranged for 2-metre radiography in the prone position. It will be noticed that the lay-out involved placing the X-ray tube in a specially arranged box in the room below; the box is supported from the ceiling, in which an aperture is made opposite to a fixed point in the room above, where is placed a couch of new design, having a quick movement in two directions and capable of being locked instantaneously in any position. Thus the patient is, as it were, centred to the tube by means of the known fixed point. All controls are, again, close to the operator's hand, and a "danger" sign is put into action in the room below immediately the high-voltage current comes into use.

The secondary current obtained is sufficient to enable a radiograph to be secured in 1/10th of a second at the full distance of 2 metres. The 10-kVA transformer has been placed in a separate enclosure in the lower part of the building, which ensures, first, safety from accident through interference and, secondly, entire absence of noise in the operating rooms. The latter is an important consideration in such an institution as the Brompton Hospital, where the condition of patients is frequently such as to make them extremely sensitive to sudden or terrifying sounds.

In the course of a valuable paper read at the November meeting of the British Institute of Radiology a speaker emphasised the desirability of the banishment from the X-ray examination room of all such apparatus as power units, with their attendant high-voltage connections, and visualised departments wherein nothing would be seen of the X-ray plant excepting a couch or other accommodation for the patient, and a control table for the operator; there would be then a total absence of noise, danger and distraction. It is precisely on these lines

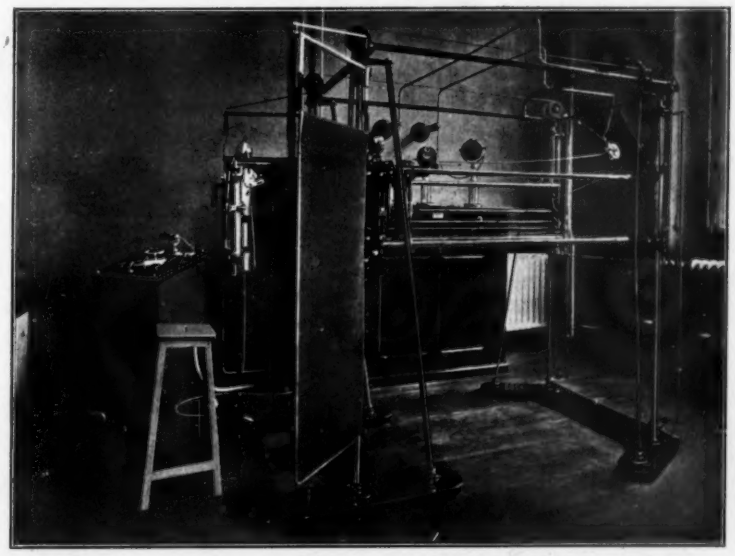


Fig. 2.—The 2-metre Vertical Screening Stand and Power Unit.

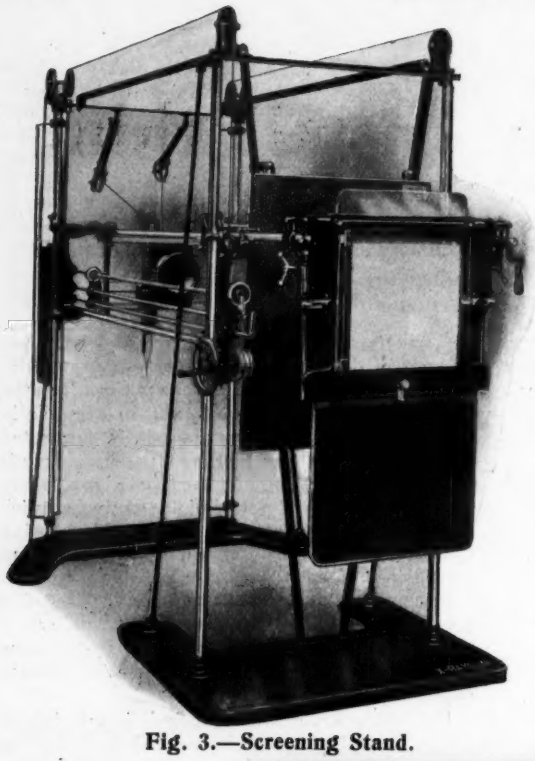


Fig. 3.—Screening Stand.

The 10-kVA transformer is oil immersed, giving an output of 100 mA at 104,000 volts, r.m.s. The main supply is at 400 volts d.c., which necessitates the employment of a rotary convertor capable of an output equal to 8 kVA, continuous rating, thus permitting a load up to 15 kVA to be imposed on it for such short periods as are necessary in the course of the hospital work. The alternating current at approximately 360 volts is then transformed to 200 volts, which thus forms the actual supply voltage to the high-pressure transformer. Rectification is by means of a rotating disk with sphere collectors.

In order to maintain an even current for the purpose of filament heating, a supply is taken from a separate 200-volt main, which is in turn converted in the usual manner by a separate rotary convertor.

The control board is mounted for greater convenience on a trolley table, which may be placed in any position convenient for the operator. The instruments provided are: ammeter for high-voltage transformer primary current, kilovoltmeter indicating secondary potential, time clock for automatically controlling exposures. A simple switch on this board controls a remote oil-immersed contactor switch that actually governs the high-pressure supply. Regulation of the high-voltage current is by means of both auto-transformer and series-resistance control, enabling any type of tube, whether gas or hot cathode, to be employed. An independent foot switch of the usual type is also incorporated.

Regarding protection, it should be explained that the X-ray tube, which is for the purpose of distance radiography in the prone position and is placed in the room below the operating room, as already described, figs. 1, 4 and 5, is enclosed in a large container protected with 3 mm. of metallic lead. Between the aperture in this box and the underside of the couch upon which the patient is placed is a conical enclosure that is also fully protected and connected to earth as an additional safeguard against electrical risk to the patient and operator. A thin sheet of aluminium is permanently se-

that much of the department at Brompton has been planned.

A separate room has been equipped for X-ray examinations of a more general character than those described above, and all customary routine radiographic work can be carried out without interfering with the special "distance" examinations for which the 2-metre apparatus is primarily intended. A room is also set aside for therapeutic work, for which, again, separate plant is provided. The examination of films is facilitated by the provision of a room containing a row of illuminated desks, with the usual means for critical modulation of the lighting. In order to be able to examine without inconvenience wet films of an urgent nature, the viewing desks are fitted with "gutters" to carry away the moisture from the films under inspection.

One of the most interesting sections is that devoted to vertical radiography at a distance of 2 metres. The stand which has been constructed for this purpose, figs. 2 and 3, is considered to be complete in every detail; a "Metalix" tube is employed, and every control of the power unit and also of the various parts of the screening stand is immediately adjacent to the operator. That this piece of apparatus is eminently suitable for the purpose for which it is designed will be realised when it is stated that within a few days of its completion no less than six similar stands were either ordered from, or included in pending estimates of, its makers.

Fig. 4.—Couch for Radiography in Prone Position.

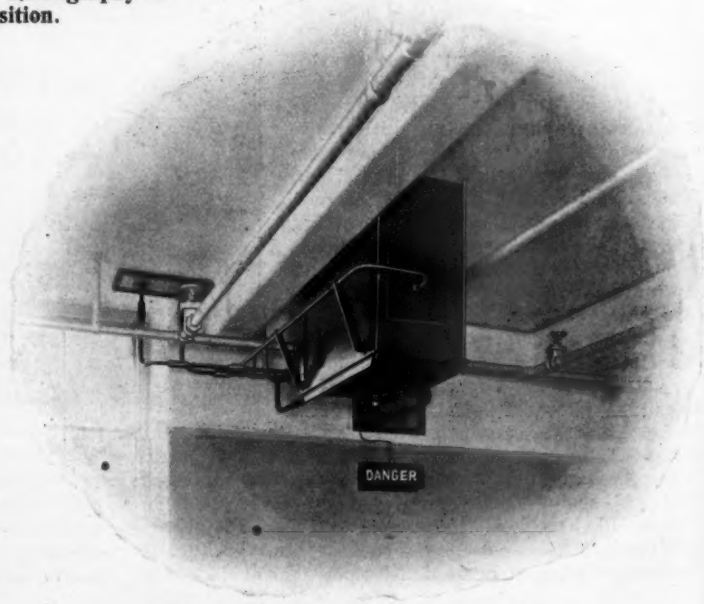


Fig. 5.—Protected X-ray Tube Box.

cured in place in the conical shaft. An important feature of this installation is that no high-voltage leads are exposed in the room in which examinations are taking place. The necessary connection is established through a wooden enclosure which receives the high-voltage tubular leads when they emerge from the floor below. The milliamperemeter and the filament-current ammeter are fitted on the top of this enclosure, so that there is virtually no possibility of any ill-effect of any kind from the high-voltage current employed.

For the purpose of vertical work at a 2-metre distance, a 20-in. induction coil is employed in conjunction with a self-rectifying type of hot-cathode tube, no auxiliary form of rectification being used.

The apparatus in the general departments has been largely modified and adapted from the plant which was in use at the hospital prior to the reorganisation. The apparatus as a whole conforms with the recommendations of the X-ray and Radium Protection Committee, and the arrangement and decoration of the rooms has been carried out with a view to securing the best possible working conditions for the staff.

The entire design, construction, and installation of the Brompton apparatus has been carried out in their own factory and at the hospital by Messrs. X-Rays, Ltd., Mr. F. R. Butt having been responsible for the whole of the work, to the specification framed by Dr. Stanley Melville. It may be mentioned that this contract represents one of nearly fifty complete X-ray installations which have been dealt with by this firm during the past few months, in addition to a large number of smaller contracts of a varied nature. Amongst the more important may be noted the equipment of new departments at the North Wales Sanatorium, Denbigh; the Dunfermline Hospital; Jenny Lind Hospital, Norwich; Newton Abbot Hospital; the Miners' Hospital, Redruth; and the Talgarth, Lenham, and Winsley sanatoriums may also be cited as good examples.

Since 1925 the firm has been under the control of Mr. Cuthbert Andrews, and it enjoys the distinction of manufacturing throughout in its own factory in London every part of the apparatus in which it specialises, with the exception of such small commercial accessories as simple switches, meters, &c.

Standardisation in Industry.

A Few of its Advantages.

By I. S. A.

TO-DAY we are fast losing our reputation as a "nation of shopkeepers," and are becoming a race of efficiency and standardisation experts in all walks of life. In industry, finance, professional, and domestic circles the imprint of standardisation can be traced.

What constitutes standardisation, and what are its advantages to the different phases of life to which it is applied? Is it not really the old word "method" brought to a state of high efficiency and taken from its old everyday meaning to a more scientific sphere of usefulness? Method is generally used to describe the way in which a particular job, or operation, is performed. Standardisation, surely, is the unification of methods, or a common way of performing certain tasks and producing certain products, with a view to greater effectiveness and the cheapening of the commodity.

At first sight it would appear that standardisation would tend to oust the individual element, but this is not so, for standardisation gives an individual a chance to prove his efficiency in the particular task in which he is engaged. Standardisation in industry and manufacture is, perhaps, the one with which readers of this journal are most conversant. Closely allied as it is with mass production and a high state of efficiency, both human and mechanical, it is surely the only royal road by which industry can put itself on a sound economical basis.

Standardisation does not mean that all manufacturers of a similar product are going to produce exactly the same article with monotonous regularity, or that there will be no variations in design or appearance, but rather that old and cumbersome methods of manufacture and the old rule-of-thumb calculations will be superseded by simple and efficient operations and mathematical calculations.

Designs, whilst giving full play to the individual mind, will be on lines of similarity for various products, thereby enabling the same machinery to be used for many more operations than heretofore, and with greater efficiency on behalf of the operator. The same tools can be used over a much larger range and the number required can be considerably reduced, with a consequent reduction of that irritating item "special tools."

Standardisation enables replacements of mechanical parts to be made immediately, whereas in the past it was a matter of some conjecture in many works to know exactly what had been previously supplied, and, even when known, often the replacement did not fit. Standardisation has also greatly simplified the work of the costing department, and has enabled manufacturers to adopt efficient costing systems which, with little trouble, will show them exactly what their manufacturing costs are.

Some trades have benefited more than others by standardisation of manufacturing methods. To name a few, one can put forward the motor-car industry, motor-car electrical equipment, and small electric motors. In those three industries in particular standardisation has evolved order from chaos and has enabled manufacturers to proceed with steady developments which would have been seriously retarded under the old order of things. Prices in those three trades in particular have been considerably reduced in recent years, thereby causing a greater demand for the product, more employment, better wages, and consequent greater purchasing power amongst the community connected with them.

The spirit of standardisation has also been manifest in other departments of industry besides manufacturing, such as Standard Conditions of Contract for which B.E.A.M.A. and the I.E.E. are jointly responsible; the I.E.E. Regulations for the Electrical Equipment of Buildings; and the various specifications of the British Engineering Standards Association, all of which have helped the electrical trade in particular in its forward march of progress.

In financial circles, too, standardisation is prominent. The Stock Exchange controls most of our financial dealings; its members make certain definite charges for their services, and its business is conducted through certain recognised channels. In banking and other financial circles everything is carried on in a staple condition of standardisation.

Professional circles also, the accountancy and secretarial professions in particular, have very high standards of efficiency. Standard systems of accounting have been evolved for almost every trade, and company secretarial practice is largely standardised by modern

business methods. The domestic realm is not altogether unaffected by this spirit of standardisation. Do we not cook by a standard electric or gas cooker? Housework is becoming more standardised through the use of vacuum cleaners and other mechanical aids, and in every instance it can be said that its effect is to promote efficiency and progress.

To standardisation has been attributed a great deal of America's prosperity, and it does great credit to its exponents in this country, who, in spite of totally different economic conditions, have successfully applied its principles to our large manufacturing industries. It has certainly played a great part in our recovery from the slump that followed the short post-war boom, and although unemployment is still rife in this country, it would undoubtedly have been much worse if the old order had still been in existence.

It is incumbent upon all of us to support to the best of our ability any serious attempts that are made towards standardisation, no matter what directions they may take, as it is undoubtedly a great asset to the economic conditions of the nation.

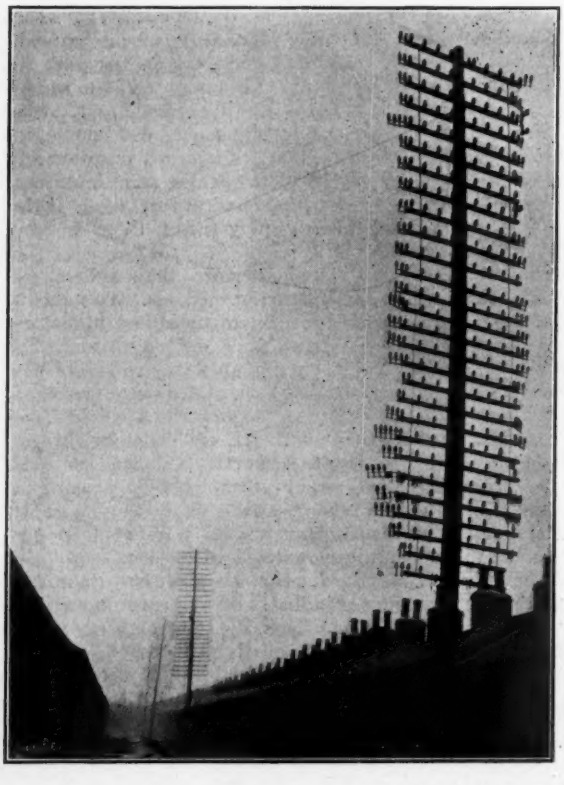
Long-distance Telephone Cables.

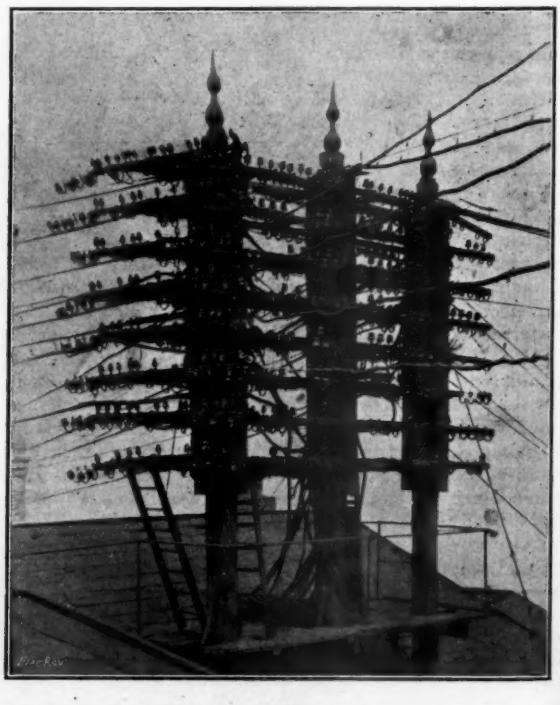
How and Why They are Placed Underground.

By A. ENGELHARDT, D.Ph., and H. COBDEN TURNER, M.I.E.E.

(*Continued from page* 147.)

IT is only oceans that cannot yet be spanned by a telephone cable, but the successful telephone service between North America and Europe, carried on by the co-operation of the engineers of the British Post Office and the A.T. & T. Co., with wireless transmission of speech proves that even seas no longer form barriers to telephone intercommunication.





Figs. 6 and 6a.—Examples of Crowded Overhead Telephone Lines.

As already mentioned, fine wire can now be used and a cable containing 1,000 pairs can easily be made; such a cable would be accommodated in a 3½-in. duct, whereas in overhead practice this quantity would have to be divided between all the main and secondary roads, railway lines and canal banks, for it should be remembered that the average full-size telegraph pole only carries 30 pairs of conductors; also its liability to storm damage and its disfavour with the public as an eyesore (see figs. 6 and 6a) increases more rapidly than its carrying capacity. For this reason underground cables are displacing overhead lines for interurban and junction lines as well as for trunk lines.

Of the European countries Great Britain and Germany have made the greatest advance in this respect. In Great Britain (see fig. 7) 527,000 wire miles, equal to 60 per cent. of the whole working trunk system, are already underground and year by year the change over is being carried further.

In Germany over 8,000 km. of cables has been installed (fig. 8). Sweden has put into service the cable route Stockholm-Gotenburg, and is installing a cable between Stockholm and Malmo and from Stockholm to the north. France has connected Paris with Strasbourg, Lille, Boulogne-s-M, and Le Havre, and is constructing cables from the capital to Bordeaux and Marseilles.

Italy has interconnected Milan, Turin and Genoa by means of a telephone cable and is constructing a national network to Naples and Trieste. Austria began by in-

Fig. 7.—Map of England, Main Underground Telephone Routes.

stalling a telephone cable from Vienna to Passau, then to the Hungarian and the Swiss frontiers, and it is expected that she will soon take in hand the laying of a cable between Czecho-Slovakia and Jugo-Slavia. For some years Norway, Denmark and Holland, Switzerland, Czecho-Slovakia and Hungary have also been engaged in building up a national cable network. In Egypt the General Electric Co., Ltd., of London, is now engaged in laying a cable containing 69 circuits between Cairo and Alexandria (120 miles) for the Egyptian State Railways.

In order to increase the traffic capacity of a cable it is now the general practice to form a third speaking circuit from every two pairs of wires by means of the well-known phantom circuit. In the year 1908 Dr. Ebeling put forward a method of loading the phantom circuit by means of a separate set of coils having the windings so connected up that the fields due to the speech currents flowing through the loops of the two side circuits neutralise each other, while the speech currents of the phantom circuit flowing in parallel through the two windings assist each other (German patent 209,655 of 5.8, 1908.) The reverse holds good for the set of coils in the side circuits (fig. 9). This effected an increase of 50 per cent. in the traffic capacity of a trunk telephone cable, but it could only be applied in actual practice after means had been devised for overcoming the cross talk due to the three conversations being carried on simultaneously over the four wires of a quad forming the phantom circuit. Such cross talk is due to inductance and capacity unbalances. The inductance unbalance can be sufficiently overcome by using three different lengths of pitch, one each for the twisting of each pair of wires forming the side circuits, and the third for the subsequent twisting of these two pairs to form a quad. To correct the capacity unbalance is a little more difficult. Fig. 10 will help to explain the cross talk due to capacity unbalances. It shows the partial capacities between the four conductors of a phantom circuit, as well as those between all the other conductors and the earthed lead cover; 1_A, 1_B are the conductors of one side circuit and 2_A and 2_B those of the other side circuit. The partial capacities Y_1 and Y_2 of each pair are of no interest, but the side partial capacities X_1 to X_4, as well as the earth partial capacities W_1 to W_4, associated therewith, are important. W_1 and W_3 affect the capacity between the conductors 1_A and 2_B as W_1 and W_2 affect the pair capacity between 1_A and 1_B. In the simplified diagram in fig. 11 the partial capacities to earth are included in the pair and the side capacities.

Take, for example, cross talk caused by the pair 1_A, 1_B in the pair 2_A, 2_B. An alternating potential generated between 1_A and 1_B sends a current round the loop, closed at the distant end, as well as over the pair capacity Y_1 and over the series-connected side capacities X_1, X_2 and X_3, X_4. The conductors 2_A and 2_B will have a potential induced in them which is about half that between 1_A and 1_B, in accordance with the drop in potential in the capacities X_1, X_2 and X_3, X_4. If the potential of the conductor 2_A differs from that of 2_B, an equalising current

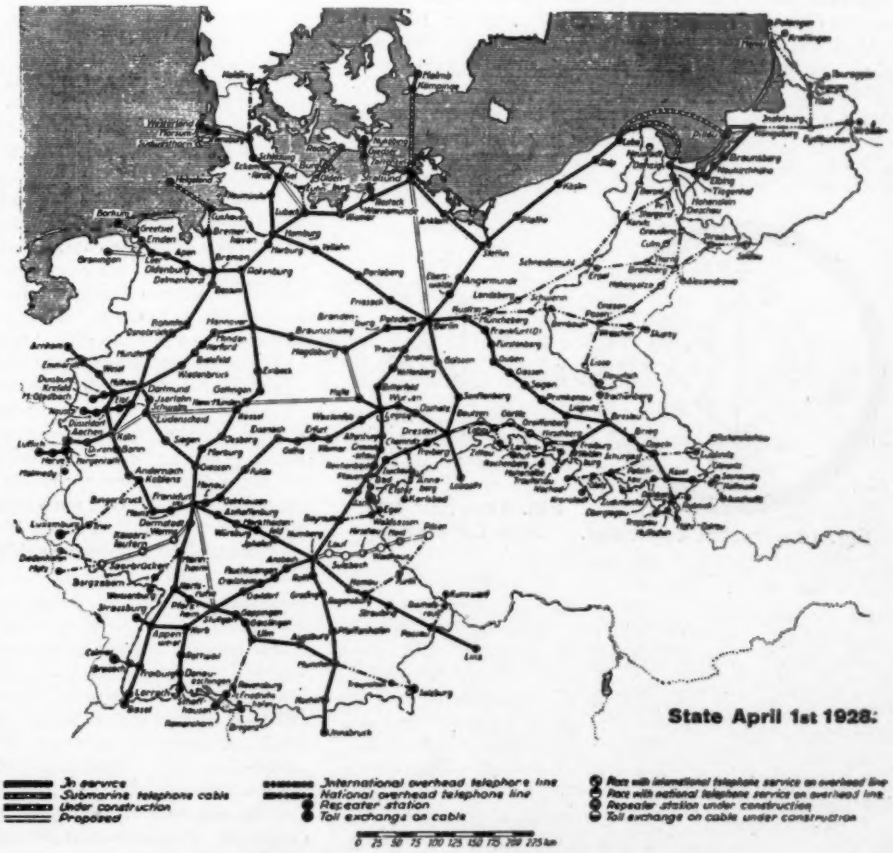

State April 1st 1928.
In service
Submarine telephone cable
Under construction
Proposed
International overhead telephone line
National overhead telephone line
Repeater station
Toll exchange on cable
Pass with international telephone service on overhead line
Pass with national telephone service on overhead line
Repeater station under construction
Toll exchange on cable under construction

Fig. 8.—Map of Germany, Long-distance Cable Routes.

will flow over the loop 2_A and 2_B; this causes the conversation over the pair 1_A, 1_B to be overheard in the pair 2_A, 2_B. In order to maintain 2_A and 2_B at the same potential, the side capacity x_1 must have the same ratio to x_2 as that of x_3 to x_4. For the same reason it is necessary to make all the four side capacities equal to one another in order entirely to eliminate cross talk from all three circuits of a quad. This can be achieved by connecting an auxiliary condenser in parallel with each of the three smaller of the four side capacities in order

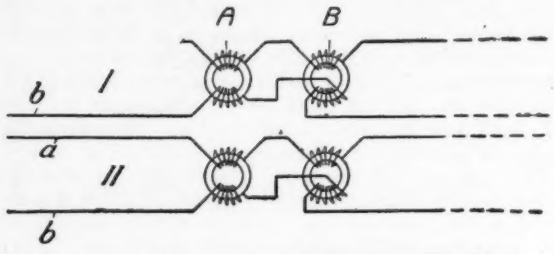


Fig. 9.—Diagram of 4-coil Phantom Working.

to raise all four to the same value. The three condensers must be inserted along the line at intervals which are short with respect to the wave-length of the frequencies to be transmitted, in order that the capacities to be equalised may still be treated as points. The loading sections form convenient lengths for this purpose. Siemens & Halske have adopted 20 micro-microfarads for the degree of accuracy of the balance, and so they obtain an average value of the cross talk $B > 9$, that is to say, less than one 65-millionth part of the energy is transferred from one circuit to the other. This method, used by the General Electric Co., Ltd., and Siemens and Halske, is applied in practice by simply measuring the capacities along the route in order to ascertain the correct size of the balancing condensers, which are then placed like a girdle round the cable at about the middle point of a loading section. The condenser sleeve can take the place of a usual junction box (fig. 12).

Another much used method developed in England and America (Blackwell Auderegg U.S.A. Patent No. 1064433 of 11/4/12, and the Post Office Engineers' *Journal*, Vol. 7, page 1 iv/1914, Vol. 7, part 4 1/1915) is to measure the unbalances at the joints between the factory lengths of cable, say one-tenth of a mile each, and in joining the wires of one length to those in the next crosses are made with other pairs or cores, so that the unbalance of one length tends to neutralise that in the

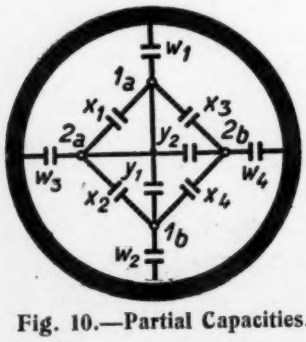


Fig. 10.—Partial Capacities.

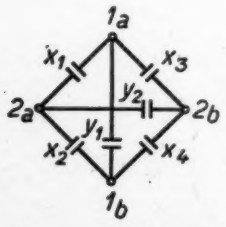


Fig. 11.—Pair and Side Capacities.

next. The General Electric Co., Ltd. (Pirelli-General Cable Works, Ltd.), in addition to using this method, has developed another (British Patent No. 302,373 Pirelli-General & H. T. Werren) in which the crosses are confined within a core, so that jointing is simpler. The correction of unbalances is achieved by taking account of the unbalances, not only in adjacent, but also in subsequent lengths. This method has the additional advantage that it is applicable as well to cables with a small number of wires.

A further advance in the arrangement of the loading coils for phantom circuits was due to Campbell, who suggested the use of three instead of four coils. The third or phantom coil possesses four windings and replaces the two coils previously used. It will be obvious that changes due to magnetic effects are less likely to occur with this system (see fig. 13).

Where telephone cables are laid alongside electric railways or other power lines, the power currents of the latter induce in the telephone cable conductors potentials which are discharged to earth through the respective capacities. The value of the resulting current depends on the impedance of the earth loops; that is, it mainly depends on the value of the earth capacities. When the earth capacities of the two conductors of a loop circuit differ from each other, the magnitude of the current will determine the drop of potential along the conductors. These potential differences are balanced out by a current which flows through the subscriber's set connected to the end of the line, so that the harmonics of the power current are heard in the receiver. This trouble should be prevented by equalising the earth capacities of each branch of the two side circuits and of the phantom circuit. This is most conveniently done by crossing the four wires of a quad at the middle point of each loading section. In actual practice it is desirable to keep the accuracy of the balance within 0.3 per cent. in order to obtain freedom from these noises.

The side and earth capacities are, of course, not independent of each other, and for this reason the symmetry between the conductors to earth would again be destroyed if the cross talk balancing were carried out after the earth balancing had been done, and *vice versa*. This difficulty is overcome by making the partial capacities, instead of the capacity complexes, equal to one another.

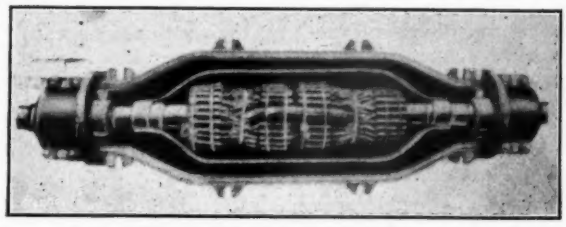


Fig. 12.—Condenser Sleeve.

On account of the above-mentioned interdependence, it is advisable on the first installation of the cable to balance against earth before balancing out the cross talk, even though the cable be not liable to be affected by power lines for some years to come.

Unbalance of resistance and inductance of the cables and the coils would also cause a difference in the drop in potential along the conductors traversed in parallel by the current, and thus cause the power lines to disturb the telephone service and give rise to cross talk between side and phantom circuits. It is possible with a set of loading coils to keep the symmetry in the two branches of a side circuit under 0.03 per cent. with respect to inductance, and under 0.15 ohm. with respect to resistance. It is also easy to arrange matters so that the inductance differs less than 0.5 per cent. in the coils of a set for the out and return line of the phantom circuit. By so doing no noise due to power circuits need be feared, but noise would arise if the coil were to have its inductance altered by magnetisation. Thus it is of paramount importance to use coils having cores such as dust cores which cannot be magnetised.

When a telephone or telegraph line runs alongside an electric power line, or an electric railway, for a considerable distance, the fundamental frequency of the power circuit can induce dangerously high voltages in the telephone line. For example, a pressure of 11 volts per 100 amps. per km. is to be expected when an open wire line is located 25 ft. from the centre of the track of a single-line railway without track bonding. In the case of an underground cable the induced voltage is reduced by the conductivity and the self-induction of the cable sheath. The power current induces in the sheath, as well as in the wires, electromotive forces E_{om} and E_{oa}, re-

spectively, which lie about 90 deg. behind the inducing power current I_o (fig. 14). E_{om} gives rise to a current I_m in the cable sheath, and this current increases as the resistance of the sheath is reduced. Its phase angle ϕ with respect to the generated voltage E_{om} approximates more closely to 90 deg. as the self-induction and conductivity of the cable sheath are increased. This current in the sheath in turn produces in the cable wires an induced voltage E_{ma}, which lags about 110 deg. and is itself added vectorially to the voltage E_{oa} directly induced in the wires by the power circuit. The angle between I_m

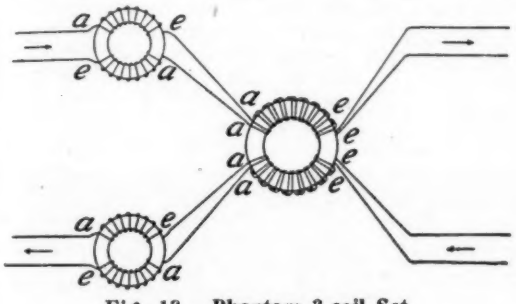


Fig. 13.—Phantom 3-coil Set.

and E_{ma} is greater than 90 deg., because the inducing and the induced field in the sheath are not in phase owing to hysteresis. The resulting voltage E_a decreases as E_{ma} approximates more closely to the magnitude of E_{oa}; in other words, it decreases in value as the current in the sheath I_m increases and as E_{ma} and E_{oa} more exactly oppose each other in phase, that is to say the more closely ϕ approximates to 90 deg. The conductivity and self-induction of a bare lead sheath or a sheath with flat-wire armouring are sufficient to reduce the voltage induced in the cable wires to 0.8 of the value for an open wire line; this is called a "protection factor" $(p)=0.8$. The conductivity of the cable sheath can be increased by interconnecting the sheath and armouring with copper bonds at each joint box, while the self-induction can be increased by means of hoop-iron armouring. In this manner it is possible nearly to halve the induced voltages and to obtain a protection factor $=0.6$. According to recent inventions one may further increase the self-induction of the cable sheath by using special armouring wire of higher permeability, giving a protection factor $P=0.4$, and the conductivity can be increased by the insertion of bare copper wire over the binding. If this copper insertion has a cross section of 20 sq. mm. (0.03 sq. in.), one succeeds in reaching a protection factor $p=0.2$; a combination of the last two methods reduces p even to 0.15, thus diminishing the induced voltage to less than a sixth of its original value. Furthermore, these devices also eliminate the noise which would otherwise be heard on the telephone line. The connecting up of boosting transformers to the rails and the provision of a separate return feeder for the purpose of protecting the communication plant will not be dealt with here, as it comes into the province of the power engineer. It is obvious that where cables run alongside electrical railways, particular care must be taken to ensure high dielectric rigidity of the insulation of the wires, coils and balancing condensers.

A large electricity supply company in Lancashire has recently made measurements of induced voltages between a 0.2-sq. in. three-core 33,000-volt lead-covered paper-insulated double-wire armoured cable and a pilot wire which ran along side it for 9,600 yards, at a distance of 3 in.

The pilot wire consisted of 7/.029 3-core cable, paper insulated, lead covered, double wire armoured.

It was found that with 44 amps. in one core of the cable a voltage of 22 volts was induced in each core of the pilot and 92 volts was induced in each of the other cores of the main cable.

Under extreme short-circuit conditions (not measured) the voltage in the pilot wire was estimated to be 2,000 volts.

It has been shown that communication engineers have

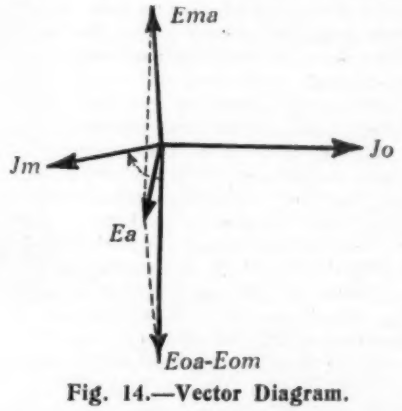


Fig. 14.—Vector Diagram.

made great progress in overcoming the dangerous voltage rises and noises occasioned by the power circuits, but this does not absolve the power engineers from the duty of doing their utmost to reduce the short-circuit currents to restrict their scope and to suppress harmonics in the power circuits.

(To be concluded.)

Small Motors as Household Helps.

The advantages of closer co-operation between designers of domestic apparatus and small-motor manufacturers.

By A. H. AVERY, A.M.I.E.E.

FRACTIONAL-HORSE-POWER motors in the household, as a means of labour saving and speeding up the work generally, have a practically unlimited future, and the sooner our salesmen realise this the better for our home industries. Jobs that are regarded as sheer drudgery can be carried out expeditiously by their employment with an almost entire elimination of the human factor. In the house of the future one can well-nigh visualise the housekeeper directing most of the domestic affairs of the home from her boudoir by a series of push-button controls, setting in motion more or less automatic devices for cleansing, scouring, dust-removing, heating, cooking, ventilating, and transporting.

The natural distaste for dirt and drudgery implanted in every normal human being is the incentive to the development of all these labour saving devices; and, with the spread of rural electrification, here and now is the time for the live salesman to exploit this line of merchandise and awaken buyers to their possibilities.

Already English manufacturers are in danger of being ousted by foreign competition on their very own doorsteps. The production of fractional-horse-power motors is on such a vast scale abroad that it is exceed-

ingly difficult for the English manufacturer to compete successfully on a small turnover, while wages are high and the rate of exchange remains adverse. In fact, more is to be looked for by smart salesmanship and prompt service than from attractive prices. The only real remedy is to extend our markets and increase our turnover until the cost of producing the British-manufactured article is comparable with that of foreign supplies.

In the meantime, our strongest line is "service" and deliveries. It is not much use to take a patriotic line with big buyers. The 1914-18 European war is too faint a memory. They will buy British-made motors fast enough when they compare favourably in price with the foreign article, but it needs something more than a strong sense of patriotism to negotiate successfully when sentiment is antagonistic to profits. Until the British maker can offer his small motors at a price no greater than those of his foreign rivals his chief hope of pulling off a contract lies in quicker deliveries and better service than possible with those whose works are abroad.

The one thing that will help the British manufacturer at the present critical time is to increase his sales by every means in his power, since price is governed by quantity; it is by smart salesmanship that the situation can be saved, by finding fresh uses for small power drives, and by seeing that each particular territory is being fully exploited so far as the use of motors for every conceivable domestic and factory purpose is concerned.

It is of no use labouring the fact that we are a curiously apathetic nation and somewhat slow in the uptake. We like to be sure of our ground; we like to see how our neighbour gets on with his new fangled ideas before making a move ourselves. Meanwhile the enterprising foreigner gets in the thin end of the wedge, makes his wares prominent, and the name familiar. The result is that when the matter is ripe for further development the British manufacturer starts under a handicap. The buyer of an already known device has naturally more confidence in it than he has of a new and untried production, and unless the substitute can be offered at a more attractive figure, or possesses marked advantages in some direction or another, it is exceedingly difficult to push one's rival off the doorstep. Let us therefore spare no effort to be first in the field; let us open up new devices, new ways of doing things, and new applications for domestic-labour-saving; even though factories may require a large number of motors there are far more houses than factories in the country, and every one with purchasing potentiality. Let us all become obsessed with the idea that electric motors are neither a hobby nor a luxury, but a real necessity resulting in an ultimate saving alike of time, effort, and pocket. Nearly all the tasks in the house that can be done by muscular exertion can be done better and quicker by electromotors; they are tireless and conscientious operatives, free from the human liability to shirk their jobs.

"Buy British Goods" is a slogan that will not carry weight, however, unless the purchase carries with it the guarantee of sound performance and attractive price; also a continuation of service after sale. This last proviso is a point that may well be stressed. British goods in British territory ought to carry with them the ability to keep in constant touch with the buyer, to forestall his needs, to carry out his repairs and generally to look after him in a way that is impossible when the factory is abroad. Promptitude is the soul of business, and frequently the means of opening up a connection that would otherwise have been impossible owing to delays attendant upon overseas transit.

At present all manufacturers are labouring under the disadvantage of being called upon for far too many different ratings. Standardisation of voltage and frequency will have far-reaching effects, chiefly in the direction of enabling the manufacturer to concentrate on a few particular sizes and outputs, instead of a legion of different ratings. One well-known firm making fractional-horse-power motors admits having well over four hundred standard ratings between the range of $\frac{1}{100}$ and $\frac{1}{4}$ b.h.p., and even then requests for new and intermediate performances are frequently received. The number of permutations possible for a standard horse-power are simply amazing when different combinations of speed, voltage, frequency, and characteristics are examined.

Designers of apparatus for which electrical drives are required give insufficient thought to the conditions which make for low costs. They frequently build up the whole device and trust to chance that they may find a motor of some suitable dimensions and performance that will fit in, both with their requirements and the available space that is left. The result is often a needlessly expensive motor, because it so far deviates from ordinary standard dimensions, &c., that it has to be re-designed to comply with the specification, or special patterns and additions made. If, on the other hand, an existing standard motor were taken at the outset, and the appliance it is to drive designed to suit it, instead of *vice versa*, the immediate result would be a general lowering of cost. On both sides, therefore, the advantages of closer co-operation between designers of domestic apparatus and motor manufacturers is indicated.

All manufacturers of small motors know what it is to receive inquiries from prospective buyers who want quotations in lots of from 1,000 to 10,000, but ultimately place orders for a dozen or two; and many of them succumb to the temptation and get saddled with the cost of patterns, tools, and jigs for an anticipated output that fails to materialise. All who are responsible for the design of motor-driven apparatus, no matter of what nature, would do well to bear in mind the overwhelming advantage to be gained by taking standard products as a basis, because standardisation and mass production go hand in hand with economic conditions.

The fast approaching universal supply of 230-volt, 50-cycle, alternating-current will almost revolutionise the small-motor industry. Troubles incident to commutators, brushes, and variable-speed characteristics, which have acted as a deterrent to the more extensive use of direct-current motors in small sizes, will practically disappear. The commutatorless induction type split-phase-start motor with its indestructible squirrel-cage rotor, without complications of any kind and no wearing parts except the two bearings, is the ideal of simplicity, and its constancy of speed is also a characteristic that can never be attained by any direct-current fractional-horse-power motor.

Hydrogen-Ventilated Synchronous Condensers.

Mr. Robert W. Wieseman, in a paper presented at a meeting of the American Institute of Electrical Engineers, stated that hydrogen is an excellent cooling medium for high-speed rotating electrical machinery. When it is substituted for air, a machine can be operated at a higher load with the same temperature rise, and the windage loss is reduced to one-eleventh. Furthermore, since no oxidation can take place, the life of the insulation is increased, and short circuit and corona troubles are very materially reduced. The machine is especially quiet, and it can be placed out of doors without increased expense. The first commercial application of hydrogen cooling to electrical machinery was made with a 12,500-kVA outdoor synchronous condenser, and another, rated at 20,000 kVA, is also in operation; both of them were brought into service in 1928. The results obtained to date have been very encouraging, and three more machines, rated 15,000 kVA, are under construction. Not only have the hydrogen features of the machines performed satisfactorily, but also during the past winter the machines operated successfully out of doors without protection from the weather. Thus they should reduce overhead expense.

An Unusual Lighting Installation.

It is an achievement indeed when booksellers can be prevailed upon to illuminate their premises along really modern lines.

IT is pleasing to be able to refer to a bookshop that is illuminated on really up-to-date lines, and the new bookshop of Messrs. Ward, in Baker Street, W., will doubtless be welcomed by book lovers whose tastes may be met in surroundings that are bright and appropriate to many of the themes that contribute to "best sellers." The shop front itself provides a foretaste of what to expect inside—it invites one to enter. The framing is of stained oak, a plain, simple effect, in keeping with the spirit of modern window display. This window, a night view of which is shown in fig. 1, provides an excellent example of how prints and books may be exhibited in happy harmony in a relatively small space, and without an overcrowded effect. A set of plain oak adjustable shelves forms the central feature, and a display of books is arranged at varying heights around it, by the use of plain oak blocks of different sizes and extremely useful and unobtrusive display fittings.

Fig. 1.—Bookshop Window Lighting.

The window is enclosed by drab coloured curtains suspended from a metal rail, and the base is covered by a soft, felty material of a similar drab hue. The result is that the books stand out individually, and not in the usual indiscriminate profusion which only tends to distract or confuse the passer-by. The display is illuminated at night by "GECoRAY" reflectors concealed at the top of the window, and therein lies perhaps the whole secret of the success of this well-equipped shop. These reflectors are so arranged that they direct an intense flux of revealing light on to the various publications displayed in the window.

The lighting, which is carried out by "Osram" gas-filled lamps, causes the whole display to stand out with the utmost clarity, so that titles and other descriptive particulars can be read with the utmost ease. The shop-window lighting has been designed so that none of the light is wasted, the whole being directed on to the goods displayed by means of the special contour and distributive qualities of the reflectors. The great merit of this system of lighting lies in the fact that there are no bright sources of light in the line of vision, and nothing to detract one's attention from the closest study of any book, print, card, or other article in the window. It is claimed that the lighting renders legible the tiniest of print displayed in the window.

A window does not make a shop, however, although it contributes very materially to the success of the latter. It is not sufficient that the window only should attract the interest of the passer-by. The interior of the shop must offer every inducement to prospective purchasers, and one of the greatest inducements is well-designed lighting. The interior of Ward's bookshop, fig. 2, excels in a sea of softly-diffused lighting that reveals an array of books and works so ordered and arranged that an immediate selection is rendered possible of one's chosen author or some eagerly desired new thriller.

This lighting, which is carried out by "Britalux" units supplied by the General Electric Co., Ltd., harmonises so excellently with the light oak panellings, shelves, and display tables, that the large and airy interior compels one to refrain from making the usual hurried departure; one is tempted to stay. Everything is so spick and span, so inviting and so alluring, that at night this shop is thronged with would-be purchasers. If it were dark and gloomy the reverse would certainly be the case.

Fig. 2.—Interior Lighting at "Ward's."

Reviews.

Electricity in Agriculture. By C. A. Cameron Brown, B.Sc., A.M.I.E.E. Pp. 75. Oxford University Press. London: Humphrey Milford. Price 2s. 6d. net.

This publication contains (*a*) the report of an investigation, made by the Oxford University Institute for Research in Agricultural Engineering, into rural electrification in the area of the Chester Corporation; and (*b*) some general considerations, deduced mainly from the results of that investigation. Eight farms were chosen, and these were visited by an observer every day for a year. Special meters were fitted by the Chester Corporation engineers—one farm having seven installed—with a view to ascertaining (1) the amount of electricity used and its normal incidence, (2) its division between farm and domestic uses, (3) its division among the various farm operations. The types of farm were arable, stock, and dairy, in varying proportions.

The general conclusion drawn from the investigation is that if the domestic equipment is proportionate to the standard of the house, the domestic load is the most important. The highest consumptions occur in the winter, even in the case of a purely dairy farm; since, although the dairy load is greatest in the summer, the combined load is much higher in the winter.

Tables are given showing the motors installed, with their duties and quarterly and annual consumptions for different purposes; there is also a complete set of curves for weekly consumptions, and (in appendices) notes on ploughing in France and particulars of consumption on farms in different areas in Great Britain. The second part of the publication contains some serviceable estimates of population in rural districts and a complete electrical distribution scheme in an area of 200 square miles. The author favours the three tension system of supply, apparently because it has been found the more economical for similar conditions in Sweden. We see no reason for introducing another stage in the several transformations required before electricity from the alternators of the selected stations is delivered to the consumers. There is not enough difference, nowadays, between the costs of 3,000- and 11,000-volt distribution to justify the additional transformation. The author has seemingly been misled by differences in costs of overhead line construction at different voltages, and from them he draws erroneous conclusions. This is no doubt due to his assumption that the size of conductor "is a relatively small item in the costs of high tension lines." We fear that the voltage regulation in the widespread network shown on p. 74, if designed for the costs given on p. 57, would not make satisfied consumers. Another assumption which appears unwarranted is that the Central Electricity Board would supply such an undertaking at 0.5d. per kWh, irrespective of load factor. Part of the Board's charges would almost certainly depend on the kW demanded and should be added to the fixed charge due to distribution. The book is distinctly weak as regards distribution estimates, and its value lies in its reference to farm experience. Several useful suggestions are made, such as the superiority of ocular demonstration of facts over argument, and the probability of electric ploughing and cultivating following the successful adoption of electricity for other purposes. It is pointed out that motors larger than the load should necessitate are often used owing to bad voltage regulation, and it is suggested that if temporary conditions make low voltage inevitable, large motors should be hired with a view to their later replacement by permanent motors of the right capacity. It is held that there is no need for a specially designed motor for barn work, standard protected type motors with ball-bearings, proving quite satisfactory. The importance of continuity of supply to some services, *e.g.*, milk treating plants and milking machines, is emphasised.

Ondes et Electrons. By Pierre Bricout, Docteur es Sciences, Repetiteur à l'école Polytechnique. Pp. 215; figs. 57. Paris: Libraire Armand Colin. Price 9 fr.

The three sections of this small volume contain all the essential facts about electrons and electromagnetic waves, and provide an attractive summary of both the classical and quantom theories and their experimental bases. The first section, on the electron starts with a few pages on the element ary properties of electrified bodis, and then passes quickly by way of the general properties of free electricity to the charge on an electron, Millikan's experimental method being outlined and a full and clear account given of Schottky's method based on the temporal fluctuations in the thermionic emission in a valve. The electron in motion is next dealt with in thirty odd pages of admirably selected mathematics on the uniform and accelerated movement of the corpuscle, and the determination of e/m. The second part, on the electromagnetic wave, is equally good, and includes chapters on the propagation of waves, the optical effects of motion, and the restricted theory of relativity. As in the preceding sections, Dr. Bricout couples each experimental fact with its precise mathematical formulation and the immediate consequences of the latter, so bringing out clearly the double aspect of each phenomenon. The last section (Énergétique des Ondes et Électrons) is perhaps less good, but is, from its nature, not so susceptible of comprehensive treatment. The transfer of energy between waves and electrons, considered as elementary and statistical processes, and modern hypotheses on the structure of matter cannot receive more than a skeleton treatment, even in the marvels of condensation to which one has become accustomed in this series, but what has been included has been chosen with discrimination, and its compact nature relieved by a good presentation. There are a short, but well chosen, bibliography and a table of contents, and each chapter is preceded by a brief statement of its aim.

The whole book would be of great value to a person of moderate mathematical attainments who wished to obtain an accurate and fairly complete treatment of the subject; the mathematical sections, in particular those on the electron in motion and on electromagnetic waves, cover ground required of physics students in most honours examinations, and are confidently recommended for this purpose.

K. G. E.

Engineering Economics. By T. H. Burnham. Pp. xiii+326; figs. 12. London: Sir Isaac Pitman & Sons, Ltd. Price 10s. 6d. net.

There are at least three books in the language with "engineering economics" in their titles, and it is a tribute to the magnitude of the field to say that they all treat of entirely different subjects and in fact have hardly a theme in common. Perhaps some day there will be a technical "boundary commission" which will decide, *inter alia*, what constitutes engineering economics and in what way it differs from the economics of any other productive industry. In the meantime the present work is neither more nor less than a book on economics for engineers, which is very much what a book of economics might be for builders or bootmakers. That is to say, it is a study of economics, such as might be useful to an engineer, or anyone else, engaged in productive enterprise of a factory nature. It deals with no specifically engineering problems, but it treats of subjects which must be understood by anyone qualifying for a post on the administrative side. Moreover, it covers very closely the "economics" syllabus of the examination for Associate Membership of the Institution of Mechanical Engineers.

Approximately one half of the book is devoted to economics *per se*. Separate chapters are devoted to economic "laws," money and banking, exchanges and trade cycles, wages, companies, advertising, and insurance. There is also a historical chapter on the industrial revolution. To cover such ground in such a space inevitably means a great deal of skimming. On the whole, the author has done his compression with considerable skill, but it must be stated at once that, however useful for cramming purposes, such a survey is very little use by itself to one who really wishes to understand the subject. The first chapter, in particular, is little more than a precis of the field of pure economics, and anyone requiring an indictment of the examination system could hardly find a more flagrant example. Fundamental economic ideas, such as that of *productivity* (or returns) and that of *marginal*—ideas which have important workings-out in engineering—are dismissed in a line or two. Moreover, with such compression, miss-statements are inevitable, such as that "the value of machines is derived from the value of the things which they will produce." The other chapters of this section have a little more breathing space, and on the whole represent very useful surveys of their respective fields. Particularly is this the case in the historical summaries contained in several of the chapters. But whilst dealing with general economics it is a pity that the author could not, in passing, have stressed the more particularly engineering examples; thus, in dealing with monopoly, mention should have been made of public utilities, such as electricity undertakings.

The second half of the book treats of an entirely different subject, namely, the organisation and management of productive enterprises. The danger in this subject is of having too many pious sentiments and too few brass tacks. It is the easiest thing in the world to string out a number of paragraphs which no-one can deny, but very difficult, indeed, to lay down something tangible and useful. There is probably no subject in which the sneers of the "practical" man for the "theoretical" are so often justified. In the present case, although the author has not been invariably successful in avoiding these dangers, he does lay down some sound and solid principles for efficient works management, and even some of his vaguer remarks contain some illuminating suggestions. Organisation, lay-out production, and inspection each receive an adequate chapter, and there are several very helpful charts and diagrams. These are followed by chapters on motion study, costing, storekeeping, legislation, welfare, and research. One or two specimen forms and lay-outs are given, and these could with advantage have been more numerous. Lack of precision is again the enemy, and all too often the book states "cards are got out" or "instructions are issued" without saying how or by whom.

Summarising, it may be said that the author has adequately covered his syllabus, and it is not his fault that the syllabus (at least as regards the earlier part) is one that invites superficiality. The book is thoroughly well produced and the price is a reasonable one.

D. J. B.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.

The South American Mission.

On July 25th Lord D'Abernon and the other members of the Government Economic Mission and Sir Herbert Gibson, chairman of the British Empire Trade Exhibition which is to be held in Buenos Aires next year, were entertained at dinner by the Latin-American Society of Great Britain. In a letter regretting his inability to be present, Mr. A. Henderson, Foreign Secretary, said that the Government was so convinced of the value of such missions that it intended to extend inquiries at a later date to other South American countries. The letter was read by Mr. Gillett, Parliamentary Secretary to the D.O.T., who proposed the health of Lord D'Abernon and Sir Herbert Gibson. Responding to the toast, Lord D'Abernon (chairman of the Mission) said that there were few more promising countries than Argentina and Brazil. Because they were complementary to Great Britain there was a certain absence of rivalry which facilitated trade between the countries. Sir Herbert Gibson and the Brazilian Ambassador also spoke.

A Scottish Wireless Exhibition.

It has been decided to hold a Scottish Wireless Exhibition in Waverley Market, Edinburgh, from November 12th to 22nd, 1930. The exhibition, which will be the first to be held in Scotland confined exclusively to radio, is being promoted by Mr. T. Percy Bentley, and the Scottish Radio Retailers' Association is to support it.

Annual Holidays.

The works of Brook Motors, Ltd., Huddersfield, will be closed from August 10th to 17th inclusive for the annual holidays.

The Ipswich works of Messrs. E. R. & F. Turner, Ltd., and Bull Motors, Ltd., will be closed from noon to-morrow (Saturday) to 9 a.m. August 12th.

Brookhirst Switchgear, Ltd., announces the closing of its works from August 3rd to 11th, inclusive.

Irish Free State Electrical Imports.

The Irish Free State Ministry of Industry and Commerce has issued detailed figures of imports during the three months ended March last, comparing them with the corresponding quarter of 1928. From these we have compiled the appended table, showing the value of the total imports of electrical machinery and cognate material into the Free State and the amount attributed to the United Kingdom, as country of shipment, but not necessarily of manufacture:—

	Total imports Jan. to March,		U.K. share Jan. to March,	
	1929	1928	1929	1928
	£	£	£	£
Electric wires and cables ...	30,917	49,228	20,571	12,545
Telegraph and telephone instruments and apparatus	2,865	2,711	2,816	2,471
Electric lamps and parts ...	18,423	11,423	10,594	7,897
Batteries and accumulators	5,040	5,817	4,490	5,207
Radio sets and parts ...	25,166	27,848	24,932	27,540
Other electrical goods and apparatus	68,247	22,220	57,814	16,089
Generators	33,223	2,680	5,495	2,500
Motors	12,122	6,227	10,643	3,142
Other electrical machinery	56,363	21,105	14,462	13,746
Totals	£252,366	£149,259	£151,817	£91,137

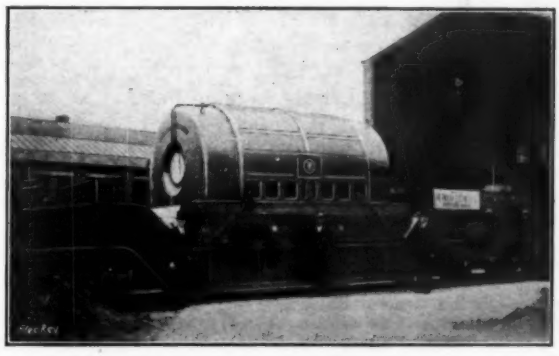
As will be seen, of the total imports £151,817, or approximately sixty per cent., came from ports of the United Kingdom, leaving £100,549 for foreign countries, the bulk of which is credited to Germany.

New French Companies.

Among the companies recently formed in France are the Société de la Pile Hydra, to acquire and carry on a dry battery manufacturing business at Levallois-Perret, Paris, with a capital of 2,100,000 fr.; the Société de l'Entreprise, Transport et Distribution d'Electricité, Paris (23, Rue Pasquier), capital 630,000 fr.; and La Société l'Electro-Domestique Protos, Paris (10, Rue Pergolese), capital 250,000 fr., to manufacture domestic electrical appliances.

A Large Alternator Stator.

The accompanying illustration shows what on the railway is regarded as an exceptional load. The stator is 19 ft. 8 in. long, 9 ft. wide at base, and 9 ft. 6 in. high at the centre. It weighs 71 tons and has an output of 31,250 kVA. It was manufactured by the English Electric Co., Ltd., and is shown leaving the company's Stafford works loaded on an 80-ton trolley ready for transport by the L.M.S. Railway to the Leicester Corporation Central power station. There it will be coupled to the 25,000-kW, 3,000-r.p.m. two-cylinder steam turbine which has been built at the company's Rugby works. Special precautions were



A Large "English Electric" Stator.

taken to ensure the safe travelling of the load, the train being limited as to speed, with frequent stops for examination, one of the railway company's inspectors being in charge throughout the journey.

A Domestic Development Booklet.

The North Metropolitan Electric Power Supply Co. has issued a booklet for the information of consumers, actual and prospective, in which the advantages of electricity in the home are set forth. Particulars of the company's service are given, and illustrations of the apparatus available from the company appear. In addition there is some useful general information, including instructions on how to read a meter.

Book Notices.

"Electricity in Agriculture," by C. A. Cameron Brown, B.Sc., A.M.I.E.E. (Bulletin No. 5 of the Institute for Research in Agricultural Engineering, University of Oxford (75 pp. and 15 diagrams.) Oxford: Clarendon Press. Price 2s. 6d.

"Science Abstracts" (A and B). Vol. XXXII. Part 7. July 25th, 1929. London: E. & F. N. Spon, Ltd. Price 3s. each.

"Theory and Design of Electrical Machines," by F. Creedy, M.I.E.E., pp. xvi+349; figs. 228. London: Sir Isaac Pitman and Sons, Ltd. Price 30s. net.

Indian Electrical Imports.

Electrical equipment valued at 56,00,000 rupees was imported into India during April last, as compared with 19,63,000 rupees in the corresponding month a year ago.

Electricity in a Carnival.

In a recent Hospital Carnival at Abertillery (Mon.) the Urban District Council's Electricity Department (engineer: Mr. Dawson Thomas) entered a tableau, which was mounted on a horse-drawn van and comprised cookers, &c. The sides of the vehicle bore a number of appropriate "slogans."

Electrical Hire-Purchase.

The United Dominions Trust, Ltd., which specialises in the financing of hire-purchase schemes, announces its intention of forming a subsidiary company, with a capital of £250,000, to deal especially with the distribution under long-term credits (sale, hire, or hire-purchase) of all kinds of electrical equipment for domestic and industrial purposes. Sir Arthur Steel-Maitland has joined the board of the United Dominions Trust.

D

Unemployment.

A decrease of 7,546 in the number of registered unemployed was recorded during the week ended July 15th. The total at that date was 1,136,700, as compared with 1,144,246 on July 8th, and 1,247,435 on July 16th, 1928.

Callender's Cables in India.

The scene depicted in the accompanying illustration is laid in Calcutta. The zenana bathing *ghat* seems to be rather too crowded for bathing partly on account of a barge load of Callender cable which is being hauled ashore.

Callender Cables at Calcutta.

The Leipzig Autumn Fair.

The London office of the Leipzig Fair, 1, Gower Street, W.C.1, has sent us particulars of the Autumn Fair which is being held from August 25th to 31st. A form of application for the necessary badges and vouchers and accommodation is included. There are 800 firms exhibiting in the section which is styled "Electro-Technics and Fine Mechanics, Machines."

The American G.E.C. and the A.E.G.

It is reported from Berlin that negotiations are proceeding between the General Electric Co. of America and the Allgemeine Elektricitäts Gesellschaft with a view to bringing about a closer working association. The A.E.G., it is said, intends to raise its capital and the new shares are to be taken up by the G.E.C.

The *Financial Times* reported this week that the G.E.C. had "quietly been acquiring" A.E.G. shares until it now holds between £1¼ and £1½ millions.

For Sale

Grimsby Corporation has for sale one mixed pressure steam turbine coupled to two 500-kW d.c. 500/550 V generators, and complete with auxiliaries. (See our advertisement pages to-day.)

Trade Announcements.

Celestion, Ltd., London Road, Kingston-on-Thames, has sent us particulars of its loud speakers, drawing attention to price reductions which took effect from July 17th.

We are informed that Edison Storage Batteries, Ltd., Victoria House, Southampton Row, W.C.1 (Telephone: Holborn 6673), is a new company formed by the manufacturers, the Edison Storage Battery Company, Orange, New Jersey, U.S.A., to carry on the sale and distribution of Edison storage batteries in the place of Edison Accumulators, Ltd., with which they have no connection whatever, and whose contract with the manufacturers has been terminated. In order that there may be no confusion, the Edison Storage Batteries, Ltd., is taking the necessary steps to change its name to "New Distributors of Edison Storage Batteries, Ltd."

The trade discount of "Alton" batteries has been increased as from July 18th, and the exclusive buying agreement which has been issued by the Alton Battery Co., Ltd., has been revised.

Messrs. Hook & Willis, Ltd., have removed to new premises at 13, Charterhouse Street, E.C. Their telephone number (Holborn 3171) is unchanged.

Messrs. Anslows, Ltd., house furnishers, Coventry, write to point out that their five new electrical windows are in High Street, not Hay Lane, as we stated in our last issue.

Water Power in British Columbia.

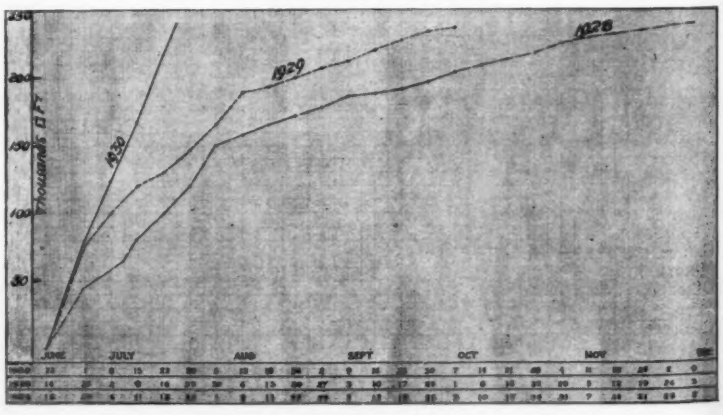
At Shuswap Falls, British Columbia, on June 15th, the Hon. S. F. Tolmie, Premier, B.C., officially inaugurated the new power plant of the West Canadian Hydro-Electric Corporation, Ltd. Speaking of the great future in store for British Columbia, Dr. Tolmie said (according to *Canada*) that they had the heritage of a country very rich in resources. There was an immense opportunity for developing the Province's water powers. He hoped some day to see the harnessing up of the power in the Province from Alberta to the Pacific Ocean. The present Government was very anxious to encourage the coming in of capital so long as it was assured that the people were getting fair play. Although, however, his Ministers were quite favourably disposed to the formation of the much-discussed Public Utilities Commission, they felt it better to continue as at present until more information was available. At a celebration banquet in the evening, the Hon. R. W. Bruhn, President of the Council, said that no more encouraging evidence of dawning Provincial prosperity on a large scale could be asked for or given than the present activity in hydro-electric circles. Away in the North, the Power Corporation of Canada had lately taken over the Prince Rupert municipal services and that at Stewart, and was going ahead with the erection of power plants, which, to earn their cost and upkeep, with fair profit on investment, would require to sell power for mining, milling ore, operating tramways, &c., ten times greater than the present demand. At the centre of population concentration, in the areas tributary to Vancouver and Victoria cities, the power pioneers of the Province, the B.C. Electric Railway Company, was this year spending approximately $10,000,000 while its adopted new construction and expansion programme for the next five years (1929 included) called for an investment of $48,000,000. For the Campbell River water power, too, a strenuous fight was being put up by the B.C.E.R. Co. and the Canadian Utilities Corporation. The plant which one of these, or else some other corporation, would build at Elk Falls, on the Campbell River, would itself cost no less than $15,000,000; what was more important, the erection of such a plant would necessitate the establishment at once of large industries to use the power developed there, industries demanding tenfold the power company's capital investment in pulp and paper plants, lumbering and shingle-making industries, mines and concentrating mills, and possibly a great coast smelter and the electrification of the railway lines on Vancouver Island.

The Co-ordination of London Transport.

The Political Correspondent of *The Times* states that the Minister of Transport, Mr. Herbert Morrison, intends to confer during the Parliamentary recess with the London County Council, the London Traffic Advisory Committee, and other bodies interested in the co-ordination of London traffic with a view to taking definite action. When the London Traffic Bills were rejected by the House of Commons, Mr. Morrison indicated his belief that the building of new tubes did not depend on the fate of those measures, and it is assumed that such schemes would, in the view of the Government, come within the scope of the Development (Loan Guarantees and Grants) Act.

The British Industries Fair.

The accompanying graph, prepared by the Department of Overseas Trade, illustrates very well how the demand for space in the London section of the British Industries Fair has speeded up during the past three years. The figures at the sides of the curves show the space applied for in sq. feet. At the bottom the three lines of dates show the periods preceding the three Fairs. It will be seen at once that before the end of last month the demand for space was as great as it was in the December before the 1928 Fair and the October preceding this year's Fair.



The Demand for Space at the B.I.F., London.

Bankruptcy Proceedings.

S. E. HUNT, 8a, Torwood Street, Torquay, electrical engineer and contractor.—The adjourned public examination in this matter was held recently at Exeter. The hearing had been previously adjourned in order that certain accounts might be filed. The debtor agreed that he had borrowed various sums of money in the expectation of a scheme proposed by the Torquay Corporation putting him right. One of his largest losses was on a contract in connection with the Wesleyan Chapel at Torquay. He denied that he became aware of his position in 1927. The hearing was concluded.

G. WILMINGTON, electrical and radio engineer, 75, Railway Street, Nelson.—The public examination of this debtor took place at the Burnley Bankruptcy Court on July 23rd. He attributed his failure to trade depression and a fire at his shop in December, 1928; while he received £120 from an insurance company as the result of the fire, he suffered further loss through being unable to share in the Christmas and New Year trade. The deficiency was £312 and the examination was closed.

A. RAUTANEN, 17, Princess Street, Shrewsbury, electrical, mechanical and wireless engineer.—Trustee, Mr. C. S. Pyke, Official Receiver, 22, Swan Hill, Shrewsbury, released July 15th.

B. MARSH, 17, Victoria Road, Brighton, electrician.—Receiving order made July 20th on debtor's own petition. First meeting, August 7th, at the Official Receiver's offices, 12a, Marlborough Place, Brighton. Public examination, August 21st, at the Court House, Church Street, Brighton.

Company Liquidations.

P. KAY, LTD., wireless factors, lately 183, Old Street, E.C.—The statutory meeting of creditors was held on July 22nd. The chair was occupied by Mr. P. M. Mordant (Messrs. Philip Mordant, Jarvis & Co.), 115-117, Cannon Street, E.C., who reported that following the appointment of a receiver for the debenture holders, the company went into voluntary liquidation, and appointed him to act as liquidator in conjunction with Mr. W. A. J. Osborne (Messrs. Corfield & Cripwell), Balfour House, Finsbury Pavement, E.C. The statement of affairs submitted showed ranking liabilities of £4,481, of which £2,643 was due to the trade, and £1,838 to Mr. P. Kay and members of his family in respect of cash advanced. The net assets were £882, leaving a deficiency of £3,599. The chairman reported that Mr. G. C. Jarvis was appointed receiver on May 15th last by the Court. Mr. and Mrs. Kay each held a debenture for £1,000. The receiver carried on the business for the purpose of liquidating the stock, and by July 5th he had collected sufficient to satisfy the claims of the debenture holders, and voluntary liquidation then took place. The company was registered in March, 1928, with a nominal capital of £5,000 in £1 shares, and Mr. Kay subscribed £1,000 for shares and also found a further £2,000 for which he was given debentures. At the date of the liquidation, Mr. Kay and his family were cash creditors for a total of £1,838. The company had carried on both a wholesale and retail business with a gross profit of approximately 10 or 11 per cent. Since the commencement the turnover had been about £23,000. It was estimated that after satisfying the debentures, costs and trading payments, the assets available for the creditors would be £400 or £500. Mr. Kay stated that he was prepared to withdraw the cash claims and a resolution was passed confirming the voluntary liquidation of the company with the present liquidators, together with a committee. The representative of a French creditor stated that he had instructions to present a petition if there was a dividend of less than 10s. in the £. The following are creditors:—

	£		£
Barnard Accumulator Co.	61	Herberhold (Utrecht) ...	232
Cleartron Valves	133	Metallwarenfabrik ...	105
Chivers & Co.	66	Paulik	62
Electro-Bobinage ...	138	Rolls-Caydon Sales ...	53
Faudels, Ltd.	79	S.A.R.E. (Paris)	53
Fonteyn & Co., Ltd. ...	105	Trelleborg Ebonite Works	54
Grammont	542	Wingrove & Rogers, Ltd.	60

ZONE WIRELESS CO., LTD., Iddesleigh House, Caxton Street, S.W.1.—The first meetings of the creditors and shareholders of this company were held on July 16th at the Board of Trade Offices, Carey Street, W.C. A statement of affairs was presented showing liabilities of £847 against assets of £152, leaving a deficiency of £475 with regard to contributories, the issued capital being 1,000 ordinary shares of 1s. each. Mr. H. P. Naunton, Official Receiver, reported that the company was formed in February, 1928, by D. D. Pyper, to acquire the business of a wireless apparatus manufacturer carried on by him at Poland House, Oxford Street, W., under the name of the Zone Wireless Co. Pyper was appointed managing director for five years at a yearly allowance of £500, for travelling and incidental expenses. The work done by the company consisted of assembling the various parts which constituted the wireless sets, no parts being manufactured by the company. The business was carried on at a loss, and it appeared that the sets were sold for less than the actual cost of production, exclusive of establishment charges. Pyper attributed the failure of the company to the manufacture of portable wireless sets by other business houses on mass production lines, which were being sold at prices lower than those at which the company could produce them. The liquidation was left in the hands of the Official Receiver.

EARLSDON RADIO SUPPLIES, LTD., 44, Albert Street, Newark-on-Trent.—The first meeting of creditors was held on July 20th at the Official Receiver's offices, Nottingham. According to the statement of affairs there were gross liabilities of £1,252, against assets of £31, leaving a deficiency of £1,221. The company was registered on October 10th, 1928, with a capital of £500. Certain goods were obtained, and in December, 1928, a writ was issued against the company for £83 for goods supplied. A man who had been a solicitor was consulted and upon his advice the remaining goods were removed to the premises at Newark. All sums received from book debts and from the sale of further goods by the company were paid to him with the intention of effecting a voluntary liquidation. The books of account were also handed to him. Nothing further had been done towards effecting a voluntary liquidation. It was stated that £122 had been paid to the man and no account had been received from him. The matter was left in the hands of the Official Receiver.

PONDAC, LTD., 44, Praed Street, Paddington, W.2.—A meeting of creditors is to be held on August 8th at the Great Western Royal Hotel, Paddington. Particulars of claims to be sent by August 30th to the liquidator, Mr. A. E. Goskar, 61, Wind Street, Swansea.

BRITISH ELECTRIC VEHICLES, LTD.—Liquidator, Mr. E. T. A. Phillips, Official Receiver and Liquidator, Carey Street, W.C.; released July 10th.

BRADNINCH AND DISTRICT ELECTRIC SUPPLY CO., LTD.—A meeting of members is called for August 12th at the office of the liquidator, c/o Christy Bros. & Co., Ltd., electrical engineers, Chelmsford, to hear an account of the winding up from the liquidator, Mr. A. A. Gates.

CHIRK ELECTRICITY SUPPLY CO., LTD.—A meeting of creditors is called for August 3rd at the Parish Hall, Chirk. Liquidator, Mr. W. G. Lloyd.

DECORATIVE LIGHTING, LTD.—A meeting of creditors was held on Wednesday last. Particulars of claims to be sent to the liquidator, Mr. T. Taylor, 12, Wood Street, Cheapside, E.C.2, by August 31st.

W. L. WHITE, SON & CO., LTD.—Winding up voluntarily. Liquidator, Mr. C. E. Cowney, 55, Temple Row, Birmingham, appointed July 9th. A meeting of creditors was called for July 30th.

J. L. GOTTLIEB & CO., LTD.—Winding up voluntarily. Liquidator, Mr. F. F. Sharles, 725a, Salisbury House, London Wall, E.C.2, appointed July 19th. A meeting of creditors is called for August 6th at the liquidator's office. Particulars of claims to be sent to the liquidator by September 28th.

TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN, LTD.—A general meeting of members is called for August 28th at the office of the liquidator, Mr. T. Froude, Monument House, Monument Street, E.C.3, to hear an account of the winding-up.

J. R. JENNENS, LTD.—Winding up voluntarily. Liquidator, Mr. J. W. Blackham, 147, Corporation Street, Birmingham, appointed July 18th. A meeting of creditors is to be held at the liquidator's office to-day (Friday).

COMMUNITY RADIO, LTD.—Winding up voluntarily for the purpose of the reconstruction and sale of the business as a going concern to Community Radio (1928), Ltd. A liquidator is to be appointed.

BRITISH POWER AND LIGHT CORPORATION, LTD.—Winding up voluntarily. Liquidator, Mr. R. M. Broadfoot, Artillery House, Victoria Street, S.W.1, appointed July 22nd. A meeting of creditors is called for August 12th at the company's offices, Artillery House, Victoria Street. Particulars of claims to be sent to the liquidator by August 10th. (This notice refers solely to the old company registered on January 14th, 1929, and is purely formal, as all creditors have been, or will be, paid in full.)

HANDLEY & ROBINSON, LTD., 17, Dawson Street, Dublin, electrical and general engineers.—Being wound up by Order of Court. Liquidator: Mr. G. H. Tulloch.

Deed of Assignment.

A. B. WAKELING, 558, Beverley Road, Hull, electrical engineer.—A deed of assignment has been executed in favour of Mr. W. B. Hall (Buckley & Hall), National Provincial Chambers, Silver Street, Hull.—A meeting of creditors in the above matter was held on July 26th, when a statement of affairs was submitted showing a deficiency of £222. It was reported that the debtor commenced business in August, 1926, with a capital of £90 advanced by Mrs. Wakeling. From the outset the debtor's trading operations were severely hampered by lack of working capital resulting in insufficient stocks for current needs, and he was unable to maintain an adequate staff. In February, 1929, he was consulted with regard to a substantial contract and was instructed to proceed with the work. Certain complications arose and he was forced to suspend operations pending receipt of further instructions, which, up to the moment, had not been received. Legal proceedings were instituted by five creditors, and the debtor was forced to execute a deed of assignment for the benefit of creditors generally. The deed of assignment was confirmed.

Dissolution of Partnership.

The R.G. Accumulator Co., 31, John Street, Bradford.—Messrs. A. H. Riley and W. Glascodine have dissolved partnership. Debts will be attended to by Mr. Riley and Mr. Glascodine will continue the business under the same style.

Private Arrangements.

Steval, Ltd., 133, Oxford Street, W., wireless dealers, &c.—A meeting of creditors was held on July 25th at the offices of Messrs. Gray, Stainforth & Co., 31, Lombard Street, E.C., when it was reported by the solicitor to the company that there was cash at the bank and in hand amounting to £108, and debtors on hire-purchase agreements totalled £16,971, but against that there were secured creditors for about £12,000. Other debtors totalled £240, and bills payable amounted to £80. The stock was valued at £1,573, and fixtures, fittings, &c., at £249. The unsecured creditors amounted to £4,796, and there were preferential creditors totalling £323. On the face of those figures, there was a surplus so far as the creditors were concerned, but the hire-purchase accounts, in some instances, were spread over a long period. An informal committee of some of the largest creditors agreed that a forced liquidation would not benefit anyone. Shortly after the committee met, the company ceased trading, and Mr. F. S. Wilks was appointed receiver for the debenture holders. The chief creditors suggested that a gentleman who was contingently liable under guarantees to certain of the finance houses, should consider offering an immediate cash composition to the other creditors. It was stated that this gentleman was prepared to purchase all the unsecured trade debts owing by the company for a sum equal to 6s. 8d. in the £. That offer was subject to acceptance by first post on July 27th, and it gave the guarantor the right to withdraw the offer if acceptances up to 95 per cent. of the total value of the unsecured debts (other than those having a preferential claim) were not received by that date. That provisional offer had already been accepted by Messrs. Bullmores, Ltd., the Dorian Wireless Co., Ltd., the Halcyon Wireless Co., Ltd., and the St. John Manufacturing Co., whose debts together exceeded £2,500, and those creditors recommended the acceptance of the offer to the general body of creditors. The creditors present were of opinion that insufficient time had been given, and suggested that the percentage should be reduced. They asked that the time given should be extended to July 30th.

The Government and Foreign Trade.

The chairman and directors of Olympia gave a luncheon on July 26th, at which Mr. J. H. Thomas, Lord Privy Seal, and Mr. G. M. Gillett, Parliamentary Secretary of the Department of Overseas Trade, were the principal guests. The chairman (Mr. Philip Hill) welcomed the guests, and mentioned that next year the British Industries Fair was to be held at Olympia. He hoped that that would be merely the first of a series of trade exhibitions. In the course of a speech, Mr. Thomas spoke of the need for the best brains to participate in our export trade. He said that he had found that our Trade Commissioner service abroad was inadequate when compared with the services of other countries, which handicapped our trade, and he had decided that the handicap must be removed. He asked business men to co-operate with the Government in this important work.

Mr. Gillett said that the Government thought that some investigation to increase the scope and value of the British Industries Fair might be helpful, and it was proposed to appoint a committee which would command the confidence of business men to deal with the matter.

Social Events.

Messrs. Cecil Cooper & Co. (London), Ltd., held their annual outing on July 20th. Accommodation was reserved in a train from Waterloo to Windsor, where the party embarked on a steamer and a trip was made to Hurley. Luncheon and tea were served on board and the party returned to Windsor at about 9 p.m. The whole of the employés, including the office staff, went, with the exception of men who were going away on distant jobs.

On July 20th, the staffs of the Revo Electric Co., Ltd., and its associated concerns spent a very pleasant time at Bearnett House, Penn, at the invitation of Mr. F. H. Reeves, managing director, and Mrs. Reeves. The Sports Committee organised the various events and Mr. Reeves entertained over 1,200 employés to tea in a huge marquee, which he had erected for the purpose in the grounds, accommodating about 400 at a sitting. The Revo Electric Works Prize Band was also in attendance, and gave a very fine performance of music. The prizes, 61 in all, were distributed in the evening by Mrs. F. H. Reeves. At the close of the day a vote of thanks was accorded to Mr. and Mrs. F. H. Reeves.

New Turkish Customs Tariff.

On October 1st a new Customs tariff is being put into force by the Turkish Government. Some extracts from this were published in last week's *Board of Trade Journal*, and among the classes shown were electric motors, dynamos, transformers, convertors, &c. The duties on these are graduated according to weight and range from £T40 per 100 kg. upon articles weighing less than 10 kg. to £T4 per 100 kg. upon articles weighing more than 5,000 kg. On batteries the rates per 100 kg. are as follows:—Accumulators and parts, £T15; wet batteries, £T8; and dry batteries, £T11. Electrodes and brushes are subject to a duty of £T35 or £T45 according to their class.

Recent Contracts.

A contract has been secured by the General Electric Co., Ltd., for the supply of the requirements of electric lamps and electric lamp fittings for the ensuing six months of the Lamport & Holt Line. These will be installed in the vessels sailing to and from South America. The company has also received from the Director of Army Contracts an order for the supply of 18,500 Osram signalling lamps.

The English Electric Co., Ltd., has received an order from the Nottingham Corporation Tramways for six double-deck, top-covered, six-wheel electric trolley 'buses, each vehicle having a seating capacity for 60 passengers. The equipment will consist of an 80-h.p. motor and standard foot-operated camshaft controller. The vehicles will be built entirely at the company's Preston works.

The Marconi Radio Royalties.

At a special meeting of the Radio Manufacturers' Association last week the terms were announced of the agreement with Marconi's Wireless Telegraph Co., Ltd., with regard to the royalties to be charged on radio receiving sets. The new licence to manufacturers will include the patents set out in the schedule to the present "A. 2" licence, and it will also cover the eliminator patent No. 148,189 and other existing and future patents controlled by the Marconi Co. and its associate the Gramophone Co. The royalty chargeable in respect of receiving sets will be 5s. per valveholder (against 12s. 6d. at present); in the case of eliminators the royalty will be 5s. when the apparatus is embodied in a receiving set, or 6 per cent. of the retail list price when it is not so embodied. The licensees will agree to the free use of their broadcasting patents by the Marconi and Gramophone Companies. The new licences will date from August 28th and will remain in force for five years. Applications for licences are to be made not later than August 24th.

Wages in the Engineering Industry.

Last week representatives of the trade unions connected with the engineering industry met in London to discuss the position arising out of the recent refusal of the Engineering and Allied Employers' Federation to concede a demand for increased wages. A decision was arrived at that the Federation should be asked to meet delegates of the unions again in September. Following upon this decision, the question of trade with Russia was discussed and a deputation of three of the delegates was sent to the Foreign Office to urge upon Mr. Henderson the desirability of resuming relations with the Soviet Government in the interests of trade. Mr. Henderson promised to give careful consideration to the views which the deputation put forward.

New Catalogues and Lists.

The Electrical Equipment & Carbon Co., Ltd., 107-111, New Oxford Street, W.C.1.—List S.C.14 giving details and prices of "Silitom" voltage dividers and List B.T.3 illustrating and describing "Elin" bell transformers, &c.

Eddystones, Ltd., Caxton House, Tothill Street, S.W.1.—An illustrated pamphlet describing the "Eddystone" device for increasing the rate of heat transmission in boiler tubes.

British Electric Resistance Co., Ltd., Ohmic Works, Queensway, Ponders End, Middlesex.—A catalogue of vitreous enamelled resistance units. Illustrated and priced.

Netherlands Cable Works, Ltd., Delft, Holland.—A well-produced catalogue, profusely illustrated in colour, showing the company's copper wire, cables and insulating paper. A general description of the works, with illustrations of the main shop, is included together with tables of the thicknesses of dielectric and lead sheathing of cables for pressures ranging from 600 V to 11,000 V.

Fescol, Ltd., 101, Grosvenor Road, Westminster, S.W.—A booklet giving illustrated examples of chromium and nickel plating by the "Fescol" process.

The Lea Recorder Co., Ltd., 28, Deansgate, Manchester.—Publication C.B.M. 13, describing in some detail, with illustrations, methods of measuring coal and granular material in bulk, with particular reference to the Lea "Cubi-Meter."

Constructors, Ltd., Birmingham.—A priced and illustrated booklet dealing with the company's steel shelving.

The Croydon Cable Works, Ltd., Mitcham Road, Croydon.—An illustrated booklet describing "Pernax" sheathed lead-covered cables and other cables, "Pernax" bird guards, &c. The back cover bears a map indicating the position of the company's new works.

Siemens Bros. & Co., Ltd., Woolwich, S.E.18.—Catalogue 820, Section VIII, containing an illustrated description of junction boxes for pyrometer installations; and Catalogue 840, Section III, dealing with electrical distance thermometers for hotels, theatres, &c. Priced.

Messrs. S. G. Brown, Ltd., North Acton.—The "Brown Budget" for July, being a well-illustrated catalogue of the company's radio receiving sets, loud-speakers, headphones, &c. Priced.

The Revo Electric Co., Ltd., Britannia Works, Tividale, Tipton, Staffs.—An illustrated and priced pamphlet advertising the company's electric fans.

THE NOX ELECTRIC LAMP CO., LTD., Clarence Road Works, Hunslet, Leeds.—A blotter advertising "Nox" electric lamps.

THE MARTINDALE ELECTRIC CO., LTD., The Hyde, Hendon.—An illustrated and priced folder dealing with the company's armature and commutator maintenance equipment, including air-gap gauges, slotting tools, cement, &c., and an electrical etcher.

THE WHITE-HALL BOILER BRIDGE CO., 35 & 36, St. Thomas Street, Lymington, Hants.—An illustrated pamphlet describing the company's smoke-consuming boiler bridge.

Messrs. J. H. SANKEY & SON, LTD., Essex Wharf, Canning Town, E.16.—A booklet, "Lowering Furnace Maintenance Costs," dealing with the company's "Pyruma" firebrick bond and fire cements.

SWITCHGEAR & COWANS, LTD., Elsinore Road, Old Trafford, Manchester.—Descriptive Section No. 23, illustrating and describing in detail metal-clad "optional" compound-filled internal isolation switchgear (Whitehead system).

Registered Electrical Contractors.

Applications for registration from the following were accepted by the Executive Committee of the National Register of Electrical Installation Contractors at its last meeting:—

Neale, A. E., Ashton-under-Lyne.
Mathers, J. S., Leeds.
Drapo & Upton, Ltd., Hull.
Jennings, W. A., Leeds.
Hirst, G. H., Leeds.
Jones, W., Ward End, Birmingham.
Merrick & Robertson, Leeds.
Calvert, W., Leeds.
West Park Electrical Co., Bradford.
Randall's, Cromer.
Roberts, H., Walton, Liverpool.
Taylor, E., Stalybridge.
Parsons, A. E., Whittington Moor, Chesterfield.
Jones, Oswald & Co., Maidstone.
Manning, J., & Co., Birmingham.
Lowe, T. & G., Cricklewood, N.W.2.
Western Electricity Supply Co., Ltd., Cainscross, Stroud.
Randall, W., Birmingham.
Priest, T. R., Blackheath, Birmingham.
Hullah, E., & Co., Stockton-on-Tees.
Hallam, G., Stockport.
Scott, H., Ashton-under-Lyne.
Bustin's Electrical Works, Banbury.
Leeds Corporation Electricity Department.

At the same meeting two applications were withdrawn and five were declined.

Prices of Materials.

Messrs. F. Smith & Co. report, July 30th: Copper (electrolytic) bars, £84 15s., 5s. inc.; ditto ditto sheets, no change; ditto ditto wire rods, £94 15s., 5s. inc.; ditto ditto h.c. wire. 11 11/16d., 1/16d. inc.

Messrs. James & Shakespeare report, July 30th: English pig lead, £24 5s., 5s. inc.

Messrs. Edward Till & Co. report, July 30th: No change in the price for India-rubber, Para fine

Messrs. James Forster & Co., reporting on July 26th, said that the lead market was very quiet all last week, and business was mainly professional, prices fluctuating within narrow limits. Quiet conditions prevail in the trade, the buying being of a hand-to-mouth character. Supplies are ample for all requirements. The price, however, is a moderate one, so that when the long-overdue revival in demand does take place, values would quickly respond, as no selling pressure is evident at the present level.

Lighting and Power Notes.

Bedford.—PURCHASE OF APPARATUS.—The Town Council has authorised the purchase of cable, water heaters, cookers, meters, lamps, &c., to the value of £5,099.

Birkenhead.—WAYLEAVES.—The Corporation Electricity Committee has decided to make application to the Ministry of Transport of compulsory wayleaves in connection with the supply of electricity to Burton and Puddington.

Birmingham.—ELECTRICITY SUPPLY PROGRESS.—At the monthly meeting of the Electric Supply Committee, states the *Birmingham Post*, it was reported that there had been an increase of 14 million kWh in the sales of electrical energy during the June quarter, which is at the rate of upwards of 20 per cent. over June, 1928. An analysis of the figures indicates that industrial conditions on the whole have improved since last year. Additional premises to the number of 2,326 have been connected during the three months. These new consumers have added to the supplies on the system 22,000 lamps and 8,000 h.p. in power supplies.

Bootle.—SPECIAL ORDER.—The Rural District Council has given its consent to an application by the Cumberland Waste Heat Owners Co., Ltd., for an Order to supply electricity to the parish of Seascale.

Brighton.—ASSISTED WIRING SCHEME.—The Corporation Electricity Committee has now agreed upon the terms of the assisted wiring scheme and has decided to seek sanction to a loan of £5,000 for its inauguration.

CABLE EXTENSION.—The Corporation Electricity Committee is to extend cable at a cost of £1,500 to meet the increased demand for electricity by the Southern Railway at the reconstructed Central railway station.

NEW PLANT.—The Corporation Waterworks Committee has decided to provide a small electrically-driven boosting plant for the supply of the parish of Telscombe at a cost of £805.

Bury.—ASSISTED WIRING SCHEME.—The Electricity Committee has decided upon the adoption for 12 months of an assisted wiring scheme.

PREPAYMENT METERS.—The Committee has also agreed to install 1s. prepayment meters at Huntley Brook and East Ward housing estates and 1d. meters at Lower Chesham estate.

Canada. — HYDRO-ELECTRIC DEVELOPMENT. — Negotiations have been concluded for the purchase by the Hydro-Electric Power Commission of Ontario of the Ottawa Valley power interests for a cash payment of $1,800,000. Through this purchase a link of about 100,000 h.p. will be added to the chain of power developments which the Commission is erecting across Ontario from the Ottawa River to the Nipigon. The properties it has acquired are four power sites, Claybank, Stewartville, Burnstown, and High Falls, and two operating plants at Calabogie and Galetta. About 6,000 h.p. is being developed by the Calabogie and Galetta plants and it is expected that the power capacity of these plants will be increased. The four undeveloped sites have an estimated capacity of 85,000 h.p.

According to the President of the Winnipeg Electric Railway Co., power from the Seven Sisters Falls plant of the Northwestern Power Co., Ltd., a subsidiary of the concern named, will be available by the end of 1930. Construction work on the plant is progressing rapidly; the crib work and temporary railway now span the river; the coffer-dam for the power house is now practically completed, and unwatering of the site will begin immediately. The new plant is situated on the Winnipeg River and development of power is expected to reach 225,000 h.p. when completed. The licence stipulates that of this total 60,000 h.p. must be developed within three years.

The Power Corporation of Canada, Ltd., has started work on a new dam and hydro-electric station at Burrough Falls, Quebec, for the Southern Canada Power Co. The falls are about 90 ft. high, and a series of rapids extend for about a mile and a half above them. The dam will be constructed in the narrowest part of the river about one mile from the falls, enabling the company to utilise the additional head of the water formed by the rapids. A pipe line 5 ft. in diameter will convey the water from the dam to the power station below the falls. The dam will be 450 ft. long and 65 ft. high, and a total head of water of 175 ft. will be available when the water behind the dam is at its maximum height. The units to be installed will be of 2,000 h.p. capacity.

Continental.—FRANCE.—The supply of electricity in Alsace-Lorraine is now centred in a group of producers and distributors at Strasbourg, the annual meeting of which was recently held at Kembs, where the first French hydro-electric works on the Rhine is at present in course of construction. According to the report presented by the managing committee of the group, 32 companies are connected with the group. These own 15 steam power stations and 12 water power plants, which have a total capacity of 220,000 kW. This region also receives supplies from neighbouring and foreign works bringing the total power available to 300,000 kW. The energy generated by these works and obtained from outside sources during 1928 reached 688,000,000 kWh. Concerning the mains for transmission and distribution the report states that the total length is 8,934 km. The Société de Transport d'Energie Electrique is about to proceed with the construction of a 150,000 V line between Logelbach and Graffenstaden, which will be the first section of a large h.p. inter-network.

Croydon.—LOANS SANCTIONED.—The Corporation Electricity Committee has obtained sanction to loans of £25,000 for mains and £10,300 for plant.

Derby.—SPECIAL ORDER.—The Electricity Committee proposes to apply for an Order to supply electricity to Radbourne, Mackworth and Kirk Langley.

Dorking.—INQUIRY.—An inquiry was held by the Ministry of Transport at Dorking on July 19th into an application for a Special Order permitting the formation of the Dorking Electricity Supply Co., Ltd., which proposes to take over the present electricity undertaking in Dorking. It is the first case in which the London and Home Counties Joint Electricity Authority has opposed such an Order. The inquiry was conducted by Sir William Marwood. There was considerable local opposition, on the ground that if the Special Order were granted it would mean that the company would be granted a monopoly for 40 years for the supply of electricity to an area including the parishes of Buckland and

Betchworth. Mr. Craig Henderson, supporting the Order, said it was to replace the old Order granted 25 years ago. That Order expired last year, and it was proposed that the present company should be taken over by a new company and carry on for 40 years, after which Dorking could purchase if it desired. Sir Lynden Macassey, K.C., for the London and Home Counties Joint Electricity Authority, said that the main object of the Joint Authority was to secure in the district the cheapest and most efficient supply of electricity. The company was incorporated in 1925, and was known as the Greater London and Counties Trust, Ltd. It purchased the ordinary shares of the original Dorking Electric Co. at £3 10s. a share. The position in Dorking was very peculiar. So far as he could read from the agreements, the undertaking did not belong to the company at all, but was really vested in the Dorking Council. He submitted that the Joint Authority's scheme for Dorking and district would benefit that district and provide cheap and abundant electricity.

Gellygaer.—Year's Working.—A net profit of £1,501 is reported on the working of the Electricity Department (electrical engineer and manager: Mr. H. McNaul) for the year ended March 31st last, as compared with £842 for the previous year.

Inverness.—Hydro-Electric Progress.—The waters of the river Ness have now been utilised for the purpose of augmenting the town's electricity supply. The work on the scheme which began a year ago has just been completed, and the plant was set in motion by Bailie MacDonald, convener of the Electricity Department of the Town Council. About a thousand kWh a day will be generated when the plant is working under ordinary service conditions.

Irish Free State.—Limerick.—The Electricity Supply Board has issued the following scale of charges for lighting in the city:—For public institutions, churches, schools, hospitals, hotels, &c., 6d. per kWh. For factories, if power is taken, 6d. per kWh: if power is not taken a charge proportionate to floor space. For dwelling houses, shops and business premises having a ratable value of £55 or over, 6d. per kWh with a minimum charge corresponding to 6s. 6d. per week; where the ratable value is less than £55, a charge based on the ratable value plus 1d. per kWh. Electricity for other domestic purposes will be charged at the rate of 1d. per kWh.

London.—Woolwich.—A dispute between the Town Council and the Erith Urban District Council as to the interpretation of an agreement for a supply of electricity to a large power user in the Erith district, has been settled by arbitration. The final account rendered to Erith amounted to £13,167, of which £10,408 was paid on account. The Erith Council contended that on the true construction of the agreement there was nothing further due, but that the Woolwich Council was indebted to Erith for £1,824, alleged to have been overpaid. The arbitrator was Mr. N. Micklem, and his decision is that the Erith Council will pay the £2,759 together with a further sum of £361, claimed as owing on the true construction of the price clause of the agreement, based on the agreement year ended April 25th, instead of the financial year ended March 31st. The arbitrator has ordered each party to pay its own costs, and half his fee—£55.

St. Pancras.—*Year's Working.*—The accounts of the Borough Council's electricity undertaking (engineer: Mr. J. T. Baron) for the year ended March 31st last, show a total revenue of £292,677, as compared with £282,205 the preceding year. Working expenditure amounted to £141,105, as against £121,028, leaving a gross profit of £151,572 (£161,177), to which was added revenue from other sources making a total of £152,732 available. Capital charges absorbed £112,147, leaving a net surplus of £40,584, as compared with £48,631 in 1927-28. The capital expenditure during the year amounted to £100,097, the chief items being £29,804 for mains and £44,577 for machinery. The sales of electricity increased from 29,614,829 to 36,749,593 kWh and the maximum supply demanded from 19,200 to 22,400 kW. The average price obtained per kWh fell from 2.19d. to 1.83d.

Nelson.—Year's Working.—We have received from Mr. G. F. Nayler, electrical engineer of the borough electricity undertaking, a copy of his report together with a statement of accounts for the year ended March 31st last. The total revenue amounted to £78,252 and working expenditure to £50,239, leaving a gross profit of £28,013, to which was added £1,007 bank interest and unemployment grants, making a total of £29,019 available. After providing for capital and other charges there was a net surplus of £4,638, as compared with £4,170 in the preceding year. Sales of electricity increased from 9,365,596 to 9,905,894 kWh, and the maximum supply demanded from 4,360 to 4,600 kW. The average price obtained per kWh fell from 1.53d. to 1.40d.

Oldham.—Year's Working.—A total revenue of £238,658, as compared with £245,569 for the previous year, is shown in a report received from the borough electrical engineer, Mr. F. L. Ogden, on the working of the electricity undertaking for the year ended March 31st last. There was a working expenditure of £117,542, as against £130,881, leaving a gross profit of £121,116 (£114,688). To the gross profit was added income from other sources, making a total of £165,509 available. After deducting capital and other charges there was a net surplus of £26,618, as compared with £29,570 in 1927-28. The capital expenditure during the year amounted to £286,788, and included £206,854 for plant, buildings, &c., for the new station at Chadderton, and £33,861 for mains. The total now spent on the undertaking stands at £1,739,591. The sales of electricity increased from 47,480,355 to 48,523,688 kWh, chiefly due to increased lighting demand, and the maximum supply demanded from 24,800 to 25,600 kW. The average price obtained per kWh fell from 1.218d. to 1.158d. The Slacks Valley power station is now practically completed and will be put into operation in time for the winter load.

Rawtenstall.—Year's Working.—The accounts of the Corporation electricity undertaking (engineer: Mr. C. L. E. Stewart) for the year ended March 31st last show a total revenue of £61,662, and working expenditure of £31,879, leaving a gross profit of £29,783. The figures for the preceding year were: Income, £65,681; working expenses, £38,516; gross profit, £27,164. To the gross profit was added an unemployment grant, making a total of £29,879 available. After payment of capital charges there was a net surplus of £5,555, as compared with £3,769 in 1927-28. The sales of electricity increased from 13,403,676 to 13,449,971 kWh and the average price obtained per kWh fell from 1.08d. to 1.05d.

Seaham Harbour.—Year's Working.—At a recent meeting of the Urban District Council the financial statement for the first year's operation of the electricity undertaking was submitted. It showed a surplus of £1,425, the total income being £7,153.

New Scale of Charges.—The Committee recommends the adoption of a graduated scale of charges by which consumers of from 1 to 80 kWh per month would pay 6d. per kWh, 80 to 500 kWh 5d., and over 500 kWh 4d. A domestic scale based on ratable value would be substituted for the room rate plus a charge of 1d. per kWh. Churches would be supplied at a special rate of 4d. per kWh.

Sidmouth.—Sale of Undertaking.—The Urban District Council has decided to sell its electricity undertaking to the Whitehall Securities Corporation, Ltd., for £35,000. There will be a profit of nearly £18,000 upon the deal, which it is suggested shall be applied, in part, to the development of the Council's gas undertaking. Electricity consumers will benefit by the change of ownership, for the purchasers have agreed to a maximum price of 9d. per kWh, whereas the Council was charging 11d. The Council itself, which is a large user of electricity, is to receive its electricity supply at 2½d. per kWh. This purchase by the Whitehall Securities Corporation is another step in the linking up electrically of large rural areas in East and North-East Devon, and follows the acquisition of several other similar undertakings. The transfer is to date as from July 1st last.

Skipton.—New Cable.—The Urban District Council, at a recent meeting, approved the application by the Yorkshire Electric Power Co. for permission to break the roads in the town for the purpose of laying a 11,000-V cable from the substation along Newmarket Street and Broughton Road in connection with the company's projected supply of electricity to Gargrave. The company gave an undertaking not to supply electricity from the cable to any consumer in the Skipton urban district, and stated that it was prepared to supply the Council in bulk at any additional point on the route of the cable, if required.

Southend-on-Sea.—Loans.—The Town Council has received sanction to a loan of £19,951 for plant and l.p. mains, forming part of an application for a loan of £48,516 in connection with the change-over to a.c. A loan of £12,000 for mains has also been applied for.

Special Orders.—Application is to be made to the Electricity Commissioners by the Urban District Council of Hazel Grove and Bramhall for a Special Order authorising it to supply electricity in the parish of Woodford and in a part of the parish of Poynton-with-Worth.

The Electricity Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising the Congleton Corporation to supply electricity in the borough of Congleton and the urban district of Buglawton.

Stoke-on-Trent.—Inquiry.—An inquiry was held by Lt.-Col. Ekin, Inspector of the Ministry of Transport, on July 16th into an application by the Power Development Co. for a Special Order to supply the Cheadle area with electricity. The application was opposed by the North-West Midlands Joint Electricity Authority and also by the Cheadle Urban District Council. Mr. R. Bury, who represented the applicants, said that if the application were successful the Power Development Co. intended to transfer its powers of supply to the Trent Valley and High Peak Electricity Co., which was already supplying the Rugeley area. Mr. John Noel Perks, a director of the Power Co., said they proposed to take their supply from the Stoke Corporation and to distribute it. Mr. H. H. Battle, clerk to the Joint Authority, said that the Authority ought to have the first right of supply in its own area. He presented an alternative scheme for the supply of the Cheadle area by the Joint Authority, and said that, subject to the approval of the Electricity Commissioners, the work could be begun at once and finished by the winter.

Taunton.—Year's Working.—It was reported by the Electricity Committee at a recent meeting of the Town Council that the total income from the working of the electricity undertaking for the year ended March 31st last amounted to £29,931. Working expenses totalled £18,089, leaving a gross profit of £11,842. After deducting capital charges there was a net surplus of £5,086.

Thornton-Cleveleys.—PRICE REDUCTION.—At a meeting of the Town Council, held recently, it was stated that the electricity undertaking had had a successful year, showing a net profit of £395, bringing the total credit of this department to £1,131, of which £600 had been transferred to relieve the rates. It was announced that it had been decided to reduce the price of electricity, for domestic and heating purposes, by ½d. per kWh, to 1d. per kWh, and for power purposes by ½d. per kWh, with a minimum of 1d. per kWh.

Walsall.—MAINS EXTENSIONS.—The Corporation Electricity Committee has authorised the extension of mains to supply Corporation housing schemes at a cost of £2,600.

Wantage.—HOUSE WIRING CHARGES.—The Rural District Council has received a letter from the Wessex Electricity Co., stating that the approximate charge for wiring to four points, and supplying fittings, &c., for the purpose of installing electric light in about 78 Council houses would be £4 per house. The Ministry of Health has offered to make a grant towards the cost provided the tenants' rent was increased accordingly. The clerk is to ascertain the wishes of the tenants on the matter.

Willesden.—YEAR'S WORKING.—The accounts of the Urban District Council's electricity undertaking (engineer: Mr. A. W. Blake) for the year ended March 31st last, show a total income of £180,945, as compared with £191,563 in the preceding year. Working expenses amounted to £123,315, as against £125,255, leaving a gross profit of £57,629 (£66,308) to which was added income from other sources making a total of £57,996 available. After providing for capital and other charges there was a net surplus of £4,397, as compared with £19,472 in 1927-28. Capital expenditure during the year amounted to £57,116, most of which was spent on mains and services. Electricity sold increased from 22,018,436 to 25,787,227 kWh and the average price per kWh fell from 2.062d. to 1.663d.

Tramway and Railway Notes.

Colchester.—TRAMWAY ABANDONMENT.—The Ministry of Transport has granted the Corporation an Order authorising the abandonment of the tramway system.

Continental.—SPAIN.—Banks in Barcelona and Bilbao are reported to have formed together with certain inland and foreign electrical firms a syndicate, under the title of the Consorcio Nacional para Electrificaciones Ferroviarias, for the promotion of the conversion of the Spanish railways to electric traction. The syndicate has offered the Government its co-operation in the execution of the projected work of electrification of the lines.

The Madrid correspondent of the *Times* reports that the railway line from Toulouse to Barcelona, entering Spain through the valley of the Cerdagne, was formally opened on July 21st by the French and Spanish Ministers of Public Works. The line is the second of three Pyrenean railways, the construction of which was provided for by a special convention signed between Spain and France in 1904. The first of these, uniting Pau and Saragossa, *via* Oloron and Jaca, was opened at Canfranc just a year ago. The third, between Lerida and Saint-Girons, is progressing slowly.

SWITZERLAND. — The statistics recently issued by the Swiss Federal Railways show that the total length of the lines served by the Federal Railways now amounts to over 3,041 km., of which some 500 km. comprise the lines of other companies. The rolling stock includes 383 engines (electric) for normal gauge, and 31 for narrow gauge. The energy necessary for electric traction is at present furnished by the six power stations at Massaboden, Ritom, Goeschenen, Amsteg, Barberine, and Vernayaz, but plans are being drawn up to put in hand the construction of two power houses at Rupperswil and the Etzel. The construction of these stations will obviate the necessity of the Federal Railways purchasing electricity from other companies, as is the case at present. The running expenses of the Federal Railways amounted to 268.5 million fr. during the last year, and the receipts were 391.6 million fr.

Dearne Valley.—EXTENSION OF TIME.—The Ministry of Transport has extended the period limited for the completion of various sections of railways authorised by the Dearne District Light Railway Order, 1915, from August 5th, 1929, to June 24th, 1930.

Exeter.—TRAMWAY PURCHASE OFFER.—The City Council has received from the Devon General Omnibus Co. an offer to purchase its tramway system. The company proposes, should the offer be accepted, to abandon the trams and replace them by a system of motor-'buses. The exact terms of the offer have not been officially disclosed, but it is said that they include the paying off of the £36,000 debt remaining on the tramways, the re-imbursement to the Council of the considerable amount of money expended on the existing motor-'bus system and an annual contribution in consideration of the right to run the city's omnibuses. It is also understood that the company signifies its agreement to the Council fixing the maximum fares to be charged and exercising control as to the character and type of the vehicles put into service. The supersession of the tramways at no very distant date appears inevitable, but the Council may decide to run a municipal system of motor-'buses rather than hand the rights over to a company.

Ilford.—TRACK RECONSTRUCTION.—The Corporation Tramways Committee has decided to reconstruct the Barkingside tramway track at a cost of £18,000.

London.—MORE WEEKLY SEASONS.—The Underground Railways have introduced a further extension of the scheme of weekly season tickets, from all stations on the Bakerloo line to all important stations on the Hampstead and City lines, and the Central London Railway.

Luton.—EXTENSION OF TIME.—The period limited by the Ministry of Transport for the completion and opening of tramways authorised by the Luton Corporation Tramways Order, 1905, has been prolonged from August 11th, 1929, to August 11th, 1930.

Nelson.—YEAR'S WORKING.—The report on the working of the Borough Light Railways Department (manager: Mr. G. F. Nayler) for the year ended March 31st last records a gross profit of £5,388. After providing for interest, sinking fund, &c., there was a net deficiency of £3,033. The number of passengers carried during the year decreased from 3,209,758 to 3,187,566, but the car miles run increased from 200,917 to 202,097. The total revenue per car mile fell from 22.37d. to 22.13d.

United States.—NEW YORK.—It is reported by the New York correspondent of *The Times* that the City Board of Estimate has authorised the construction of two vehicular tubes and appropriated $5,000,000 (£1,000,000), so that the work on both may be begun immediately. One, which is to cost $100,000,000 (£20,000,000) will bisect Manhattan Island from west to east at Thirty-eighth Street and continue under the East River to the boroughs of Brooklyn and Queens. It will have a capacity of 28,000 vehicles a day. The other, which is to cost $75,000,000 (£15,000,000) will connect Brooklyn and Staten Island under the channel known as The Narrows. Staten Island is already connected by bridges with New Jersey, so that the tube under The Narrows will make it possible for traffic from Brooklyn to reach the mainland without crossing congested Manhattan Island. The cost of the tubes will ultimately be recouped from tolls.

Telegraph and Telephone Notes.

Austria.—INTERNATIONAL TELEPHONY.—Following the completion of the grand trunk telephone line from Linz to the Swiss frontier, *via* Salzburg, the Austrian Post and Telegraph Department is now installing a north-to-south line from Lundenburg, *via* Vienna, to Gratz; the new line includes four amplifier sections. The Lundenburg-Vienna section (48.5 miles) is equipped with standard 98-pair cable manufactured at the Vienna works of the Austrian Siemens-Schuckert Co. The Vienna-Gloggnitz section (48 miles) comprises standard 166-pair cable, and the Gloggnitz-Bruck a.-d.-Mur section (45 miles) has also been equipped with 166-pair standard cable, whilst the Bruck a.-d.-Mur-Gratz-Wildon section (49 miles) has a 100-pair cable. In addition, the Austrian postal authorities have also constructed a cable line between Mallnitz (Tauern Tunnel), Bad Gastein, Lend, and Salzburg.

International Telephony. — ANGLO-BELGIAN CABLE. — The Belgian Government has made a grant of £57,000 for a cable between England and Belgium which will allow direct communication with Germany. Work on the new cable, which will be started at once, is expected to last a year.

Japan.—TELEPHONY.—The longest telephone cable in Japan has lately been completed between Tokio and Kobe, a distance of 382 miles The line is eventually to be extended to Okayama.

Mexico.—COMMUNICATION SERVICES.—A return lately issued shows that there are now about 85,000 miles of telegraph lines and approximately 60,000 telephone instruments in use in Mexico.

The Telephone Service.—PERSONAL CALLS.—On October 1st the "person to person" call will become operative in European international telephony between England and seventeen other countries already in telephone communication with Britain. Two other countries have not yet announced their decisions, but are expected to assent very shortly, while Switzerland, for the time being, has refused to do so. The change is a result of the deliberations of the Telephone Committee at the Amsterdam Conference of the International Chamber of Commerce. The British Post Office has had a leading part in bringing about the new arrangements, both by taking the initiative with other European administrations and by smoothing out difficulties. The "person to person" call, in which the caller calls a certain person and pays only if he gets him, is one of the ideas adopted by the telephone authorities in the United States in their efforts to encourage the use of the telephone. It is already operative in the transatlantic service.

NEW AUTOMATIC EXCHANGE.—A further addition to London's automatic telephone system was made at Fulham on July 27th, when approximately 2,250 lines were transferred from the manual to the automatic exchange

Radio Notes.

Australia.—NEW CONTRACTORS.—The conditions under which the Federal Government awarded the contract for the supply of news and entertainment programmes for three years from July to the Australian Broadcasting Company, Limited, are of interest. It is a new company, and it was expected that at least 300,000 listeners would have been licensed in the Commonwealth when the new contract commenced. The contractors for the supply of programmes will be paid at the rate of 12s. per licensed listener per annum, which will provide at least £180,000 a year for the supply of news and entertainment. The cost of maintaining the transmission plant of all "A" and relay stations will be borne by the Post Office Department out of the other 12s. of the listeners' licence fees, out of which 3s. per licence is payable to Amalgamated Wireless (Australasia) Limited for patent royalties. The Postmaster-General has power to enforce severe penalties if the terms of the specification are not adhered to, and he has the right to annul the contract. Advisory committees will be appointed in each State to advise the Postmaster-General's Department regarding the manner in which the broadcasting contract is being adhered to, and what improvements are considered necessary. Stations 2FC, 2BL, and 3LO reverted to the Post Office Department at the middle of July. The other "A" stations will continue to operate for varying periods up to nearly two years, but the present owners can, on mutually-arranged terms, surrender their rights to the Post Office Department at any time.

One important feature of the new contract is that the period during which 2FC and 2BL, and also 3LO and 3AR, may operate in future may be many hours weekly less than at present. The "A" stations in Brisbane, Adelaide, Perth and Hobart will have their hours increased by from 25 to 35 per cent. The Post Office Department assumes the responsibility for the erection and equipment of eight "A" stations to take the place of the present "A" stations, and also to construct 16 relay stations in provincial centres, the sites of which have not yet been agreed upon. It is anticipated that at least four relay stations will be in New South Wales.

Mr. Stuart Doyle, chairman of the new company, and his co-directors (Sir Benjamin Fuller and Mr. Frank Albert) represent a combination of the whole organisations of Union Theatres, Ltd., Sir Benjamin and John Fuller (theatres) and J. Albert and Son (music publishers), and control, jointly, fifty-four orchestras in every State in the Commonwealth.

One of their first actions will probably be to borrow from the British Broadcasting Corporation one of its leading programme directors, so that they may have the benefit of his advice in completely reorganising programmes.

In making the announcement at Canberra the Prime Minister stated that tenders were received from the United Intercessory Service (Sydney), B. Radcliffe Hawley (Nurrumbeen, Vic.), C. J. W. Robinson (director 4QG, Brisbane), D. Major and J. M. Maclulich (Melbourne), Paling and Co. (Sydney), J. C. Williamson, Ltd., Dominion Broadcasting (Melbourne), New South Wales Broadcasting Co. (Sydney), Central Broadcasters, Ltd. (Adelaide and Hobart), Broadcasters, Ltd., (Hobart), and from the firms whose tender had been accepted.

Thus the Dominion Broadcasting Co., which is a combination of practically all Australian companies, was passed over. It controls the Melbourne stations, 3LO and 3AR, and has large interests also in 2FC and 2BL, Sydney, and 5CL, Adelaide. According to *World-Radio*, it is likely to claim damages against the Commonwealth Government. Last year the Postmaster-General called on the companies controlling the stations in Sydney and Melbourne to co-operate in order to prevent overlapping and duplication of services. The companies virtually amalgamated at a cost of £40,000, which they have not had time to recover. Some recompense for losing the contract after taking this step is therefore considered by the old companies to be justifiable.

NEW STATIONS.—A tender by Standard Telephones and Cables (Australasia), an offshoot of the Western Electric Company of America, has been accepted for the erection of two of the five subsidiary stations which the Government intends to erect next year. Probably sixteen stations will be erected in the next two years, says *World Radio*, to relay the main programmes.

France.—NATIONAL CONGRESS.—It is understood that a national congress on broadcasting is to take place in Paris in November to discuss the technical, intellectual, economic, and legal aspects of the subject.

Germany.—LICENCES.—For the first time since the inauguration of broadcasting services a decrease in the licence figures is recorded, for on July 1st the number of listeners had fallen by 11,000.

AERIALS.—The Berlin police have kept a jealous eye upon the increase in numbers of wireless aerials. A Berlin Court, at the suit of an aggrieved listener, has declared invalid a police order for the removal of an aerial. The police acted on the ground that "a large number of aerials would produce a marked disfigurement of the city," but the Court found, says *The Times*, that they were justified in taking action only when a disfigurement already existed, and not when it was merely an æsthetic probability. However, they were entitled, even after tolerating the existence of a number of aerials, to forbid the erection of others if they were calculated to spoil the picture.

Spain.—TAX ON SETS.—A decree has been issued establishing a tax on wireless sets. One peseta (8d.), payable every three months, will be levied on crystal sets, while the quarterly tax on valve sets will be 5 pesetas (3s. 4d.), and an *ad valorem* tax of five per cent. will be levied on transmitting apparatus. The object of the taxes is to obtain a source of revenue for the broadcasting services, which are regarded as exceedingly important both from national and international points of view.—*Reuter* (Madrid).

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—MELBOURNE.—October 1st. Posts and Telegraphs Department. Switchboard cords. (B.X. 5515.)*

Canada.—Canadian National Railways. Power-driven shovels, with caterpillar traction. (A.X. 8230.)*

Cardiff.—August 8th. Union Guardians. Electric lighting and wiring installation and main distribution cables for Llandough Hospital. (July 26th.)

Chile.—August 9th (altered from July 12th). Ministry of Marine. Two aerial towers for the new wireless station at Arica. (A.X. 8134 and 8244.)*

Egypt.—CAIRO.—September 23rd. Ministry of Interior. Electric lighting installation and distribution system for the town of Kafr-el-Cheikh (Gharbieh Province). (B.X. 5502.)*

October 1st. Tanzim Department. Ministry of Public Works. Electric lamp standards. (A.X. 8251.)*

Farnworth.—August 16th. Electricity Department. Supply of l.p. cables. (See this issue.)

Gloucester.—August 26th. Committee of Visitors. Electric wiring installation at the Wotton and Coney Hill Mental Hospital. (July 12th.)

India.—MADRAS.—August 13th. Madras and Southern Mahratta Railway Co., Ltd. 70 a.c. motors and starters for Perambur works remodelling, with spares. (July 26th.)

London. — CENTRAL ELECTRICITY BOARD.—August 31st. Supply, delivery, and erection of 132,000-V outdoor switchgear for the Mid-East England Electricity Scheme, 1929. (July 19th.)

September 11th. Supply, delivery, and erection of 132-kV overhead transmission lines (approach to Clarence Dock, Liverpool). (See this issue.)

August 24th. Supply, delivery, and erection of metering equipment for certain stations in the area of the South-East England Electricity Scheme, 1927. (See this issue.)

LONDON COUNTY COUNCIL.—August 12th. Supply and installation of nine 1,000-kW rotary convertors with static transformers. (July 19th.)

COMMISSIONERS OF WORKS. — August 13th. Ironclad unit-type switchgear at the National Physical Laboratory, Teddington. (July 26th.)

HACKNEY.—October 9th. Electricity Department. Three 125,000 normal 150,000 maximum lb.-per-hr. steam generating units, water-tube boilers, chain-grate stokers, &c. One 30,000-kW turbo-alternator, with exciter, &c. Fourteen 6,600-V, 3-phase, metal-clad oil circuit-breaker equipments. (July 26th.)

POPLAR.—August 28th. Board of Guardians. E.h.p. switchgear, 75 kW mercury arc rectifier, and l.p. d.c. switchboard at the institution. (See this issue.)

Manchester.—August 30th. Electricity Committee. One 130,000-lb. water-tube boiler, superheater, &c. (See this issue.)

New Zealand.—WELLINGTON.—Post and Telegraph Department. September 10th. Two-conductor cords. (B.X. 5462.)*

October 16th. Supply and delivery of automatic wall and table telephones. (B.X. 5509.)*

Corporation. September 30th. Electric motors, starters and switchgear for the Milk Department. (B.X. 5508.)*

AUCKLAND.—September 16th. Electric Power Board. Supply and delivery of two 500-kW machines and switchgear for Remuera sub-station; two 1,000-kW machines and switchgear for Point Chevalier sub-station; 22,000-volt switchgear; 6,600-V switchgear; and supervisory control apparatus. (B.X. 5506.)*

INVERCARGILL.—September 23rd. Corporation. Supply and delivery of an 11,000-V, 3-phase, 50-cycle switchboard. (B.X. 5507.)*

Northern Ireland.—CARRICKMACROSS, Co. MONAGHAN.—Electric wiring installation at St. Joseph's Church (deposit £1 1s.). MacEntee & O'Kelly, consulting engineers, 23, Upper O'Connell Street, Dublin.

Rumania.—ORADEA MARE.—August 9th. Municipal Council. 400 single-phase meters, 150 V, 42 cycles, 3 amps. 200 single-phase meters, 150 V, 42 cycles, 5 amps. (B.X. 5519.)*

Salford.—August 10th. Electricity Department. L.p. paper-insulated, l.c. and armoured cables. (July 19th.)

South Africa.—PRETORIA.—Posts and Telegraphs Department. August 22nd. Telephone apparatus, including extension magneto bells, bell sets, terminal blocks, condensers, magneto generators, carbon protectors, magneto switch extensions, private branch exchange, central battery switchboards, tumbler switches, and wall and table telephones. (B.X. 5415.)*

BULAWAYO.—September 13th. Municipal Council. H.p. overhead transmission lines with accessories and stepdown transformers, pumps and motors with starters, pipework and float control gear. (A.X. 8181.)*

DURBAN.—September 27th. Corporation. Supply and delivery of three-phase ironclad compound-filled switch panels. (B.X. 5505.)*

Uruguay.—MONTEVIDEO.—August 17th. Posts, Telegraph and Telephones Administration. Telegraph wire. (A.X. 8229.)*

Uttoxeter.—August 12th. Urban District Council. Overhead 11,000-V transmission line. E.h.p. and l.p. cables and roadwork and public lighting. Sub-station equipment. (July 12th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Birkenhead.—Electricity Committee. Accepted:—
Cable (£161).—Macintosh Cable Co., Ltd.

Birmingham Corporation.—Accepted:—
Boiler control apparatus at Prince's station, Nechells.—James Gordon & Co., Ltd.
Frequency changer equipment and switchgear at King's Heath sub-station.—General Electric Co., Ltd.
Switchgear at King's Heath, Court Road, Handsworth, Camden Street and Water Street sub-stations.—Harland Engineering Co., Ltd.

Cannock.—Board of Guardians. Accepted.
Installation of electric light in the Institution, offices and board room.—F. B. Chaplin (£155).

Cheltenham.—Electricity Committee. Accepted:—
Meters for 12 months.—Electrical Apparatus Co., Ltd., Edison Swan Electric Co., Ltd., and Metropolitan Vickers Electrical Co., Ltd.
Cables.—Hackbridge Cable Co., Ltd.
Transformers.—English Electric Co., Ltd.

Evesham.—Rural District Council. Accepted:—
Installation of electric light in 52 houses at Broadway (£215).—H. Parker.

Gravesend.—Town Hall Committee. Recommended:—
Electric heating installation at town hall (£600).—Messrs. Lambert.
Synchronisation of clocks (£82).—Synchronome Co., Ltd.

Ilford.—Tramways Committee. Accepted:—
250 tons of rails (£10 14s. 6d. per ton) and 250 pairs of fishplates (£14 9s. 6d. per ton).—Dorman, Long and Co., Ltd.
Six sets of points and crossings (£735).—Hadfields, Ltd.
Electricity Committee. Material for boiler stoker replacements:—

BABCOCK & WILCOX, LTD. (Recommended.) ...	£152
E. Bennis & Co., Ltd.	234

Leicester.—Tramways Committee. Accepted:—
Special trackwork (£2,244),—Hadfields, Ltd.
Steam and feed pipe connections at the central power station. (Amended) (£1,936).—Aiton & Co., Ltd.

London.—L.C.C. HIGHWAYS COMMITTEE. Accepted:—
100 double-deck tramcar bodies (class E.3 bogie type).—Hurst, Nelson & Co., Ltd. (£172,200).
50 double-deck tramcar bodies (class H.R.2 bogie type).—English Electric Co., Ltd. (£87,400).
100 complete tramcar sets of class 4 centre-bearing swing bolster bogie trucks.—Electro-Mechanical Brake Co., Ltd. (£24,900).
50 complete tramcar sets of class 6 centre-bearing swing bolster bogie trucks. — Electro-Mechanical Brake Co., Ltd. (£15,600).
100 complete tramcar sets of electrical equipments for class E.3 cars and the assembly and connecting up of 100 class E.3 car bodies with trucks, brakes and electrical equipments, &c.—English Electric Co., Ltd. (£83,750).
50 complete tramcar sets of electrical equipments for class H.R.2 cars, and the assembly and connecting up of 50 class H.R.2 car bodies with brakes, trucks and electrical equipments, &c.—Metropolitan-Vickers Electrical Co., Ltd. (£60,000).
Sets of magnetic track and wheel brake equipments for 100 class E.3 bogie tramcars and 50 class H.R.2 bogie tramcars.—Estler Bros., Ltd. (£8,152).

ISLINGTON.—Electricity Committee. Recommended:—
Repairs and replacement to the emergency lighting battery (£461).—Tudor Accumulator Co.

POPLAR.—Electricity Committee. Recommended:—
Eight 1,000-kW truck-type hand controlled oil switches (£1,302).—Metropolitan-Vickers Electrical Co., Ltd.
Instrument equipment (£1,236).—Electroflo Meters, Ltd.
Circulating water piping (£631).—Aiton & Co., Ltd.

Northampton.—Cleansing Committee. Recommended:—
Mains and lighting for refuse disposal plant, West Bridge Works (£640).—Northampton Electric Light and Power Co., Ltd.

Stoke-on-Trent.—Electricity Committee. Accepted:—
Overhead wiring and services to various housing sites (£637).—E. Holloway.
Wiring for lighting and motors at Central power station (£971).—Barnett & Soans.

Tynemouth.—Parks and Sands Committee. Accepted:—
Electric portable pump at bathing pool (£196).—Drysdale and Co., Ltd.

Legal.

B.T.-H. Coolidge Tube Patent.

MR. JUSTICE LUXMORE, in the Chancery Division on July 25th, heard an application by the British Thomson-Houston Co., Ltd., for an extension of the period of a patent relating to X-ray tubes. The application was opposed by Messrs. Newton and Wright, Messrs. Cuthbert & Andrews, and Messrs. A. G. Dean & Co.

SIR ARTHUR COLEFAX, K.C., for the applicants, said that the opponents were contending that the war helped rather than hindered the applicants in working the patent. The characteristic of the invention was that prior to the war the X-ray tubes, which were used in the process of taking photographs, depended for their efficiency upon gas, but this invention disposed of the use of gas, the tube being charged exclusively by the heat of the cathode which was one of the electrodes. It was called a "Coolidge" X-ray tube, and belonged to the General Electric Company of the United States, which had communicated the patent to the applicants. The patent expired in June last.

His LORDSHIP granted an extension for one year.

Edison Accumulators, Ltd., v. Edison Storage Batteries, Ltd.

IN the Court of Appeal, consisting of the Master of the Rolls and Lords Justices Lawrence and Slesser, on July 25th, Sir Duncan Kerly, K.C., on behalf of Edison Storage Batteries, Ltd., said that with a view to an appeal by that company from the judgment of their Lordships dismissing its appeal from the judgment of Mr. Justice Clauson granting an interlocutory injunction, restraining the company from carrying on business under that name, it had been agreed on terms with the plaintiffs, Edison Accumulators, Ltd., that the operation of the injunction should be suspended for six weeks.

The Master of the Rolls assented.

Farnworth v. Manchester Corporation.

JUDGMENT will not be delivered in the House of Lords till the autumn in the action arising out of the alleged nuisance emanating from the Manchester Corporation's Barton station.

Something for Nothing?

The Brussels correspondent of the *Morning Post* reports that a native of Louvain has just invented a machine which he claims will revolutionise mechanical industry. This machine, he asserts, by the application of the law of gravity generates electricity at low cost. Fifty per cent. of the electricity thus produced is employed to run the machine, and the other 50 per cent. can be used for other purposes—light, heat, or power. Several successful experiments are said to have been made.

The "Electrical Review" Service Department.

Inquiries must be accompanied by a stamped addressed envelope. We should be glad to learn the following:—

Agent for the Therma universal voltage electric iron.
The address of the Electric Supply and Repair Co., manufacturers of electric lift equipment.
Ostar gasfilled lamps (actual maker's name required).

Notes.

Electricity Charges in Wandsworth.

The inquiry into the charges made for electricity in Wandsworth by the County of London Electric Supply Co., Ltd., held by Sir Harry Haward and Mr. W. W. Lackie, Electricity Commissioners, at the instance of Wandsworth Borough Council and a Consumers' Committee consisting of representatives of a number of Ratepayers' Associations and Chambers of Commerce in the borough, which was adjourned on May 24th, 1928, was re-opened at the Town Hall, Wandsworth, on July 18th, when Mr. Craig Henderson and Mr. Turner appeared for the company, and Messrs. J. D. Cassels, E. J. Rimmer and B. Mackay Cloutman, V.C., for the Borough Council, the last-named barrister also representing the Consumers' Committee.

In opening the proceedings, Sir Harry Haward remarked that since the first stage of the inquiry over a year ago the company had introduced a two-part tariff for both domestic and business consumers, the standard prices regulating the dividends which the company was entitled to pay had been fixed, and the financial returns of the company for 1928 were now available.

Mr. Craig Henderson explained that the two-part tariff had already been adopted by 25 per cent. of the consumers in the No. 1 area, and the original rates fixed for business users had been reduced. Furthermore, as from the beginning of the current quarter, the "unit" charge for both the domestic and business two-part tariff had been lowered from 1d. to ¾d. per kWh. and the flat rate from 6d. to 5½d. per kWh. The demand of the applicants for a reduction of the flat rate to 4d. was impossible.

Mr. Cassels, for the Borough Council, drew attention to the lower prices for electricity supply ruling in districts contiguous to Wandsworth. The people of Wandsworth were dissatisfied with the two-part tariff, this being evidenced by the fact that, as stated by the company, only 25 per cent. of the consumers had adopted it.

Evidence was called on behalf of the applicants. Among the witnesses were Colonel Doland (the Mayor of Wandsworth), Alderman Cresswell, Councillor Castle, Mr. W. G. Wakeling (Clapham and District Chamber of Commerce), and Mr. Chas. J. Webb (Wandsworth Ratepayers' Association), all of whom testified to the general dissatisfaction with the rates and the unequal incidence and operation of the two-part tariffs.

Mr. Cloutman, V.C., for the applicants, dealt at considerable length with the production figures and the financial results of the company.

Sir Harry Haward closed the proceedings by commenting on the absence of any information in support of the company's comparative schedule. Doubtless before making their recommendations to the Minister of Transport, the company would furnish them with any further information the Commissioners might require. To this procedure, however, Mr. Cloutman entered a formal objection, submitting that any recommendation should be based on the information elicited at the public inquiry and not on material obtained privately.

Milk Irradiation.

The medical officers of health for the County of London assembled recently at Newbury, Berkshire, to examine the first installation for the irradiation of milk with artificial sunlight to be established in England. According to the *Daily Mail*, experiments carried out in Germany at Berlin, Frankfurt, and Münich, have proved that milk so treated is a healing agent of great value to children who suffer from rickets. It has been tested in Edinburgh by the medical officer of health and by Dr. Findlay, who supervises the infant welfare centres in that city. Experimental plant has been installed on a dairy farm at Compton, Newbury. It consists essentially of an electric lamp, which emanates ultra-violet rays. The rays pass through a tube, through which the milk is pumped and each portion of the milk is subjected to the action of the rays for a period of 80 seconds. Dr. Chalmers Watson, of Edinburgh, who addressed the meeting, has achieved successful results by adding it, in the proportion of one-third or one-half, to ordinary milk. The expense of this added milk amounts to only 6d. a week per head, according to Dr. Watson. It can be sold at the price of the best certified milk. Other medicaments which have been used in the past for rickets often cost 12s. a week. The irradiation method does not change the milk in taste or appearance.

Rural Electrification in the United States.

It is claimed that the problem of providing electric service in scattered rural districts has been solved by new and simplified apparatus. It seems that fields hitherto untouched can now be reached, since the new equipment, without sacrificing safety or reliability, lacks several of the expensive parts of the conventional step-down sub-station. After a rural load has been developed with the new equipment, a larger station can be installed, or an existing distribution system extended to that district from a distant point, whereupon the original sub-station equipment can be used for developing another rural section. Instead of the usual oil circuit-breaker, relays, current transformer, and disconnecting switch, which are to be found in the conventional sub-station, there is substituted a combined disconnecting switch, fusible cut-out, and current-limiting register unit. This high-speed interrupting device protects the high-voltage line against interruption resulting from faults in the step-down transformer, sub-station structure, or distribution lines. The transformer is single-phase, oil-insulated, self-cooled, and of the outdoor type. It may be of 15, 25, or 50 kVA capacity; one end of the high-voltage winding is permanently grounded to the tank and the other end is brought out through an oil-filled bushing. The insulation throughout the new type of small-capacity high-voltage sub-station is so designed that its strength against lighting voltage is greater than that of the high-voltage line itself, thus protecting the station. The sub-station is designed for use on 66,000-volt lines, having a neutral that is solidly and permanently grounded at every power source. It is so made that it will not affect the operation of the high-voltage line because of transient over-voltages, overloads, or short-circuits.

Australian Electricity Commission.

The creation of a Commonwealth Electricity Commission and of an authority in each State to control, develop and exploit power resources is recommended in a memorandum prepared by the Commonwealth Government for the forthcoming Premiers' Conference. According to Press reports, an eminent authority on power problems has recommended that machinery be set up in each State to control electrical power development, direct the distribution of existing supplies, and investigate other power projects initiated either by Governments or private enterprise. The authority would determine zones of distribution, and control the interconnection of generating stations and transmission systems, issue power licences, and control rates and charges, advise the Government about financial assistance for the purchase in bulk of electrical energy by co-operative societies in rural communities and encourage the formation of such societies. It would educate the public in city and country about the advantages of electrical utilities in factory, farm, and home, and prepare for the Government reports on all projects over which the Commonwealth would have jurisdiction. The State body would consist of two or three permanent officials. The chairman would be an engineer of wide experience, the second member an engineer skilled in power economics, and the third an accountant. The expert has recommended that the Commonwealth Government standardise and co-ordinate frequency, voltage, and methods throughout Australia. The Government should appoint an Electricity Commission, he has said, to carry out his recommendations. It would consist of an engineer, assisted by the chairman of the State Electricity, or Power, Commissions, or boards.

Electric Furnaces

In a review of progress during 1928 the Committee on Electro-chemistry and Electro-metallurgy of the American Institute of Electrical Engineers states that in the electric-furnace industry there has been a decided increase in the use of the high-frequency furnace. Such furnaces, of the motor-generator type of equipment, have entered the field of silver melting, and it is reported that 3.76 kilograms per kilowatt-hour can be melted with this form of equipment, as compared with 2.9 kilograms per kilowatt-hour with the earlier type operated by an oscillator. The high-frequency furnace is well established in the non-ferrous field and it seems likely that it will find use in the steel foundry as a convenient means of "holding" heat. A large number of electric furnaces, mostly of the resistor type, has been installed for the nitriding processes of steel; a very hard surface is obtained similar to that produced by case hardening, but superior in some respects. Ceramic engineers have accomplished much after years of experimentation and many failures, and have succeeded in introducing the electric furnace to the glass and porcelain industries. In the carbide industries the desire to increase the unit by increasing the ampere input at 100 to 200 volts has met with difficulties, and the electric-furnace engineer is confronted with the problem of how to overcome these limits of design without increasing the voltage. At from 25 to 60 cycles the present electrical equipment will not permit of commercial operation beyond 3,000 amperes per furnace unit. A number of electric furnace installations has been recorded in different parts of the world for the production of phosphoric acid and potassium phosphate. There is every indication that the electric furnace will eventually displace the sulphuric acid process in the manufacture of phosphoric acid. A noteworthy event was the commercialisation of the electric furnace for smelting zinc from its ore; at one plant a furnace is turning out 50 tons of pure spelter per day.

A Swedish Hydro-Electric Undertaking.

The following notes, taken from "Swedish Export," concern the Hammarforsen hydro-electric station in the north of Sweden, which was completed a short time ago. The station is designed for three water turbines of approximately 16,000 h.p. each, with facilities for future extensions. The two units installed at present were supplied by Messrs. Nydqvist & Holm, of Trollhättan, and are designed on the Francis type for low speed. At 93.8 r.p.m. and 65 feet head each turbine develops 15,450 h.p., the maximum output being 16,500 h.p. The water is supplied through helical concrete ducts, and is carried off in tail-race tunnels, also of concrete. The runners have an overall diameter of 13.2 feet, and weigh about 21¼ tons each. They are constructed of cast-steel, with cast-on steel-plate buckets. The regulator collar, guide rails and guide-rail cranks are also made of cast-steel. The turbines are directly coupled to Asea vertical three-phase alternators, 12,000 kVA, 94 r.p.m., 50 cycles, 6,000-6,600 volts, 0.8 p.f. These generators are installed with their stators sunk into the floor of the generator room.

Up to two-thirds of full load the fans fitted on the rotor are sufficient for the cooling, separate fans being provided which will keep the temperature during winter within permissible limits for overloads up to 115 per cent. and 6,600 volts. On account of the low speed the generators are of exceptionally large size, the stators having an outside diameter of 28 feet, and the rotors being 22 feet across the pole pieces. They have been run at 175 r.p.m., or 86 per cent. above normal speed, in the test pits at the works. Each generator is connected to its own transformer without the interposition of oil switches. Each transformer is designed for a normal load of 12,000 kVA, with a ratio of 6,300/77,000 volts. The transformers are of the core type with cylindrical windings, and are water cooled. The transformers are erected in closed fireproof cells on the same level as the machine room floor. If a transformer has to be removed for repair it can be pushed along rails in the floor of the machine room and then lifted by one of the travelling cranes and taken out to the loading level where it can be lowered into an erecting pit provided for the purpose, and the core raised to the requisite height. The switchgear building, combined with the machine room and located on the upstream side of it, consists of a control room just above the machine-room level, and with a clear view into it, 6-kV switchgear on the same level as the control room and located behind the transformer cells, 77-kV switchgear which occupies the floor above the 6-kV switchgear, a repair shop on the same level as the 77-kV switches, offices and resistance room above the control room, and finally a battery room at the top. Each generator with its transformer constitutes a single unit as regards running, and parallel operation of the generators is accordingly arranged only on the 77-kV busbars. The 6-kV busbars are not designed for parallel working, the isolating links which make it possible to connect the transformers together on this system being furnished with operating handles which can be locked in both open and closed positions. All 6-kV isolating switches are triple pole and are rod operated from handles in the gangway.

Fused Arcing Horns and Grading Rings.

At a regional meeting of the American Institute of Electrical Engineers, Mr. Philip Stewart, of the Union Gas and Electric Company, Cincinnati, read a paper which described the use of fuses on insulator strings of high-voltage overhead conductors, to interrupt the arc at times of flashover before the line relays disconnect the circuit. The original idea was to connect a fuse between the line conductor and an arcing ring, attached to the second insulator unit. When excessive voltage occurs on the conductor to ground, there is a flash between a two-pronged horn on the top insulator unit and the ring; the circuit is completed through the fuse, which immediately opens, breaking the arc. In a later development of the principle, two expulsion-type fuses replace the two-pronged horn at the top of the insulator string, and the arcing ring is placed at the conductor end of the string. Data were presented from tests and experience on about 100 miles of 66,000-volt circuit of the Union Gas and Electric Company. Mr. Stewart stated the conclusions arrived at to be as follows:

(1) Arcing rings are essential equipment on important high-voltage transmission lines; without them many insulators are flashed and shattered, due to the cascading of the string, and shattered insulators mean a line "outage" for several hours caused by an abnormal condition existing for only a fraction of a second.

(2) Fuses in the flashover circuit interrupt and prevent the flow of follow-up current; since the fuses function in approximately one-half cycle, and protective relays are ordinarily set to operate in not less than 35 to 45 cycles, the short circuit will be cleared before the oil circuit-breaker operates.

(3) The fuse is not blown by the current of the initial surge, but by the current of the dynamic arc.

(4) The use of fused insulator strings on the high-voltage circuits of the Union Gas & Electric Co. has been a large factor in a considerable improvement in service and operating records.

(5) Tests and operating experience, as well as economic considerations, show several advantages of the assembly using fused horns at the support end of the string, over the original assembly using a fused ring at the conductor end.

(6) The adoption of fused horns and grading rings for important high-voltage lines has proved to be another means by which service and operation may be improved.

The North-East Coast Exhibition.

It is interesting to learn that the maximum demand of electricity supply taken for the whole of the North-East Coast Exhibition from the Newcastle-upon-Tyne Electric Supply Co., Ltd., was up to recently 1,300 kVA, the maximum demand over one hour not exceeding 1,000 kVA. During the month of June the units consumed at the exhibition amounted to 186,000. Considerable attention has been attracted by the electric signs on the supply company's stands at the exhibition, and the following points may be useful: The facia sign, "Electric Service," on the ends of the rest lounge and inquiry bureau is a stencil sign equipped with red, green and blue lamps, there being forty-five 75-watt lamps of each colour. The facia signs, "Electric Service," on the ends of the three remaining stands have raised letters illuminated from troughs in front. These also are equipped with red, green and blue lamps, of which there are forty-seven 40-watt lamps of red and green, and forty-seven 60-watt lamps of blue. Down the sides of each stand are facia signs, "Newcastle-upon-Tyne Electric Supply Company, Ltd.," and these side signs are similarly illuminated; the total number of lamps for the whole of the facia signs is 1,471. We learn that the Newcastle branch of the General Electric Co., Ltd., has been the recipient of many congratulations on the part it has played by its lighting installations in contributing to the attractiveness of the Exhibition. It is worth noting that the main road lighting to the Exhibition is entirely by "Wembley" lanterns. The Amusement Park, the whole of the electrical equipment of which was supplied by the G.E.C., is, however, the outstanding achievement in outside illumination. Here there are many thousands of lamps employed, as well as an abundance of fairy-land strip, both serving to give adequate illumination in the Park precincts and adding a very distinctive note to its general attractiveness. The African village and the water chute are two examples of lighting arrangement of an unusually pleasing character. The old Tyne Bridge is a further example, while the bandstand is a thing of real beauty as a result of the judicious blending throughout its structural outlines of some 200 colour-sprayed lamps. Among the interior installations, the Festival Hall, the portico of which is effectively flood-lighted, has a particularly good lighting scheme. The Grand Foyer has four 16-in. pendant fittings, and the main hall six very handsome pendant fittings with tangerine-colour bent-glass panels, each of these fittings accommodating twelve 100-watt gasfilled lamps. Special refractor fittings are disposed in several of the subsidiary departments of the hall, and in others use is made of "Britalux" pendants. Ample equipment has been put in for the lighting of the stage, including footlights, battens, wing floods, stage floods, and spotlights. Throughout the Palaces of Industry and Engineering 300-watt gasfilled lamps are used, and the illumination is accordingly on a high plane. In several instances a notable example being the exhibit of a Diesel-type engine.

The Electrical Association for Women.

At the special invitation of the President of the North Wales Branch of the Electrical Association for Women, Mrs. S. Z. de Ferranti, a visit was paid to the works of Messrs. Ferranti, Ltd., on July 23rd; 40 members made up the party. The party was conducted in groups round the works by members of the staff of Messrs. Ferranti, Ltd., the tour being excellently organised. Mrs. Price F. White, chairman of the branch, proposed a vote of thanks to Dr. and Mrs. Ferranti for their kindly and generous hospitality, and to the staff for their thoughful and perfect arrangements for the interest and entertainment of the party. Mrs. Ferranti expressed her pleasure at being able to entertain such a good number of the branch members, and Dr. Ferranti spoke a few words of encouragement in that happy vein which members of the E.A.W. speak of as the "Ferranti Faith."

Chadwick Travelling and Bossom Gift Scholarship.

In view of the quality and number of the applications received for the two Chadwick Travelling Scholarships in Sanitary Science and Municipal Engineering, advertised in January last for award in July, the trustees decided to make three instead of two appointments. The successful candidates are: Francis Bach, M.A., Medical Officer of the National Heart Hospital; Edmund A. Elsby, B.Sc., technical chemist and chemical engineer; and John B. Dempster, B.Sc., testamur of the Institution of Municipal and County Engineers. All these scholarships are tenable for one year, and are of the value of £400 each.

Another scholarship within the appointment of the Chadwick trustees is the Bossom Gift Scholarship, to enable the holder to make a specialised study and present a scheme showing the most complete and efficient system of heating and ventilation adaptable to a hall seating about 1,000 people, with smaller rooms attached and a set of residential quarters in the same building. The value of this gift is £100, and the proposed specialised study is to include, if practicable, a journey abroad. Candidates for the Bossom Gift Scholarship must be British subjects. Young engineers, architects, or students who can produce evidence of attainments indicating a capability of designing such a scheme are invited to compete, and applications should be sent between August 26th and September 30th to the Clerk of the Chadwick Trustees at 204, Abbey House, Westminster, stating name, qualifications, age and proposed itinerary, study or research. Testimonials and evidence of previous work undertaken or published should be submitted with the applications.

The Battersea Power Station.

At a meeting of the Westminster City Council on July 25th, the question of the proposed power station at Battersea was again considered, and it was decided that the Chelsea and Kensington Councils be invited to join in the promotion of a private Bill to revoke the consent given by the Electricity Commissioners to the erection of the station and to prevent the Commissioners giving consent to the erection of any further super-electricity stations or the extension on a large scale of existing generating stations within the County of London. It was urged that, as the Bill could not be lodged until November next, when the station would be approaching completion, the three Councils should ask the Ministry of Health to receive a deputation with a view to speedier action. The motion was carried unanimously.

Appointments Vacant.

Working foreman electrician for Portland Urban District Council. Junior lecturer in electrical engineering at East London College. Assistant charge or relief engineer for Islington Borough Council. Electrical engineer for the Mains Department of the Calcutta Electric Supply Corporation, Ltd. Lady electric cooking demonstrator for Newport (Mon.) Corporation. (See our advertisement pages to-day.)

Fire.

An outbreak of fire occurred in the tool room of the Streatham Hill works of the Relay Automatic Telephone Co., Ltd., on July 29th. Although the building was extensively damaged, there were no personal injuries. The company's fire brigade, under Supt. C. Allison, localised and checked the fire within 30 seconds until the fire call was answered by three brigades. The company's own fire alarm proved of service on this occasion. The fire will in no way affect the company's production.

Accident.

An employé at St. Pancras Borough Council generating station fell across the bus-bars of a generator on July 25th and received severe burns. He was conveyed to St. Pancras Hospital. All machinery driven by electricity in the Camden Town district was brought to a standstill for over an hour.

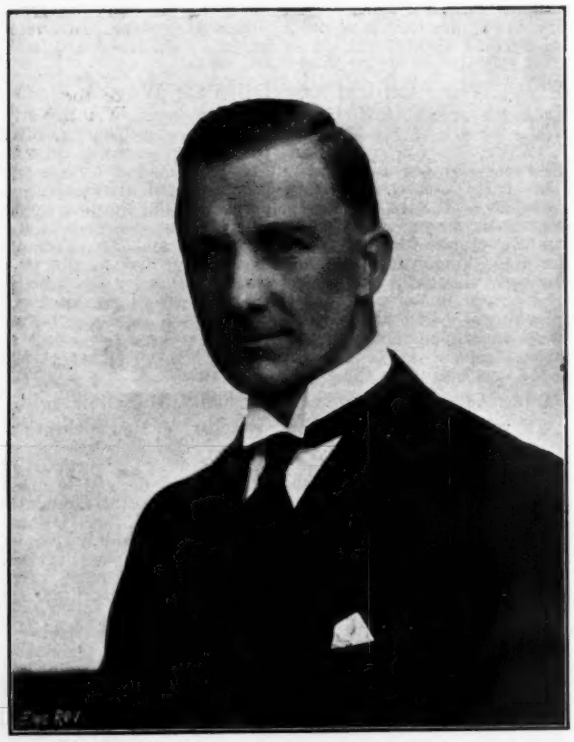
New Electricity Regulations.

The Electricity Commissioners have prepared and propose to make (i) Regulations under Schedule 7 to the Electricity (Supply) Act, 1926, prescribing the manner in which the cost of the production of electricity at selected generating stations shall be allocated between fixed and running costs; and (ii) Regulations under Sub-section (4) of Section 51 of the Electricity (Supply) Act, 1926, prescribing the manner in which the price for a supply of electricity under that Act by the Central Electricity Board to the owners of a selected generating station is to be adjusted according to power factor if and so far as the price is to be so adjusted. Representations which any interested party may desire to make in respect of the new regulations should be sent by registered post to the secretary, Electricity Commission, Savoy Court, London, W.C.2. before September 30th, 1929. Copies of the regulations can be obtained by any interested party on application to the Electricity Commission.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

As we reported last week, Mr. J. W. J. Townley (whose portrait appears herewith) has been appointed borough electrical engineer of West Ham. Mr. Townley was born and educated at Paisley, and received his engineering training in local works and at Paisley and Manchester Technical Colleges.



Walter Scott] *[Bradford.*

Mr. J. W. J. Townley.

The new Borough Electrical Engineer of West Ham.

He subsequently served on the staffs of the Paisley, Manchester, Ashton and Sunderland municipal electricity supply undertakings and with the Trafford Power Co. In 1918 he went to Barnsley as acting borough electrical engineer, and upon the return of Major Barker in 1920, returned to Sunderland as chief assistant electrical engineer. In 1922 he was appointed deputy city electrical engineer at Bradford, and he relinquished that position in 1926 to take up the post of electrical engineer to the L.C.C. Tramways, which he is now leaving. Mr. Townley has held office at local I.E.E. Centres.

At its meeting on Tuesday last, the London County Council accepted Mr. Townley's resignation, which is to take effect on September 30th. It was decded to invite applications for the position by public advertisement.

The Council of the City and Guilds of London Institute has conferred the distinction of Fellow of the Institute (F.C.G.I.) upon the following:—Mr. O. Faber, O.B.E., D.Sc., M.Inst.C.E.; Mr. G. J. Gibbs, M.I.M.E., A.M.I.E.E.; Mr. C. D. Le Maistre, A.M.Inst.C.E., M.I.E.E.; Mr. H. J. P. O'Gorman, C.B., M.Inst.C.E.; and Mr. J. S. Wilson, M.Inst.C.E. The Fellowship is conferred by the Council upon those who, having obtained the Associateship of the Institute and spent at least five years in actual practice, produce evidence of having done some original and valuable research work, or of having otherwise contributed to the advancement of the industry in which they are engaged.

Mr. A. J. B. Gosling has resigned from the Electrical Department of the London, Midland and Scottish Railway Co. in order to take up an appointment with British Talking Pictures, Ltd., Wembley.

The marriage took place at Ipswich on July 22nd of Mr. H. B. Campbell, technical assistant at the Corporation electricity works, and Miss K. L. Milliken, of Colchester.

Mr. H. Eyles, senior assistant secretary of the Birmingham Chamber of Commerce, was on Monday appointed secretary in succession to the late Mr. G. Henry Wright. A native of Birmingham, he has worked during the past 15 years in close association with the late secretary. He has controlled the work of a large number of important manufacturing and other trade organisations, particularly in relation to hardware, iron and steel, metals and hollow-ware.

We learn that the "technical officer whose duties will be specially concerned with the fostering of rural electrification," mentioned in a recent statement by the Electricity Commissioners, is Mr. E. W. Dickinson, who is at present Technical Assistant to the Chairman of the Commissioners.

Mr. R. W. Smith, for some years engineer at the Bedale electricity works, has been appointed engineer of the electricity works at Bedale, Masham, and Thirsk, which are now controlled by the Cleveland and South Durham Electric Light and Power Co.

The Gillingham (Kent) Town Council has appointed Mr. E. T. Howell, Fulham, as mains engineer, at a salary of £325 per annum, increasing to £350 after twelve months' satisfactory service.

The marriage took place at New Malden on July 20th of Mr. R. St. G. Terry, B.Sc., A.M.I.E.E., and Miss Winifred M. Tulett, of New Malden.

The following appointments have been made by the Imperial Communications Advisory Committee:—Chairman, Sir COURTAULD THOMSON; deputy-chairman, Sir CAMPBELL STUART; secretary, Wing-Commander Sir NORMAN LESLIE.

On August 1st, the following changes were made in the organisation of the Underground Group of companies: Mr. G. W. DUNCAN is to be publicity manager; Mr. H. T. CARR is to be assistant publicity manager; Mr. E. RAWDON SMITH is to be staff officer in place of Mr. G. W. Duncan; Mr. J. C. MITCHELL is to be secretary and treasurer of the three tramway companies; and Mr. A. C. INGRAM is to be assistant secretary to the Underground Group in place of Mr. Rawdon Smith. The last-named will also be assistant secretary to the three tramway companies.

At a recent meeting, the Brighton Corporation approved an increase in the salary of Mr. W. MARSH, engineer and manager of the Corporation tramways, from £922 to £1,000, and by two further annual increments of £50 to £1,100.

Mr. H. E. ELLIS, of the City Electrical Co., and Mrs. ELLIS are making a tour of Canada, the Pacific Islands, New Zealand and the United States.

Obituary.—Mr. G. G. DEELEY.—The death occurred suddenly on July 15th of Mr. George Grundy Deeley, of Appley Bridge, near Wigan, electrical engineer with the South Lancashire Tramways Co., Ltd., at Atherton. He was 41 years of age, and had just secured an appointment in the Electricity Department of the Hastings Corporation.

Mr. C. T. BRISCOE.—Mr. C. T. Briscoe, head of Briscoe and Sons, Ltd., electrical engineers and contractors, Blackburn, and a former chairman of the Blackburn Branch of the Electrical Contractors' Association, died on July 23rd, at his residence in Blackpool. Mr. Briscoe was responsible for some of the largest electrical contracts in the East Lancashire area.

Mr. E. R. TUCK.—The death is reported of Mr. E. R. Tuck, general secretary of the Association of Wireless and Cable Telegraphists. The funeral took place at Wembley on July 25th.

MR. A. E. WRAY.—The death occurred suddenly on July 20th, whilst proceeding by boat from Melbourne to Sydney, of Mr. A. E. Wray, who was during part of the war period manager of the Luton Corporation tramways whilst leased to Messrs. Balfour, Beatty & Co., Ltd. He was 43 years of age, and had been in Australia for four years.

Wills.—Sir JOHN COWAN, the late chairman of Bruce Peebles and Co., Ltd., and other companies, left personal estate in Great Britain of the value of £35,426.

The late Sir Percy K. STOTHERT, K.B.E., chairman of Messrs. Stothert & Pitt, Ltd., Bath, left unsettled property valued at £103,397 gross and £99,727 net.

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

R.R., Ltd.—Private company. Registered July 24th. Capital, £1,500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless, electrical and scientific apparatus and appliances, manufacturers and traders in gramophones, musical instruments, electrical, mechanical and all other kinds of advertising signs and appliances, &c. The subscribers (each with one share) are: J. W. E. Hustler, 30, Spring Park Road, Shirley, Surrey, manufacturer; F. T. Pankhurst, "Holcroft," Cassiobury Drive, Watford, manufacturer; W. M. Hewett, 35a, Claybrooke Road, W.6, merchant; B. Lawrence, 26, Ada Road, Camberwell, S.E.5, radio engineer. The first directors are to be appointed by the subscribers. Secretary: W. M. Hewett. Registered office: 41, Newcomen Street, S.E.1.

Manuus Manufacturing Co., Ltd.—Private company. Registered July 19th. Capital, £2,000 in £1 shares. Objects: To adopt an agreement with A. B. Smith, H. J. Smith and D. Grant, and to carry on the business of manufacturers of small metal wares and electrical appliances formerly carried on by them as the Manuus Manufacturing Co., and that of manufacturers of and dealers in wireless receivers, &c. The life directors are: H. J. Smith, 40, Grange Road, Smethwick, manufacturer; A. B. Smith, 85, Arden Road, Acocks Green, Birmingham; D. Grant, address not stated. Secretary: D. Grant. Registered office: 53, Capethorn Road, Smethwick.

Walter Jones, Harvey & Co., Ltd.—Private company. Registered July 23rd. Capital, £5,500 in £1 shares (500 7½ per cent. cumulative preference and 5,000 ordinary). Objects: to acquire (1) the business of a music dealer and manufacturer, vendor, purchaser and repairer of musical instruments and accessories, carried on by W. Jones, and (2) the business of a wireless and general electrical and mechanical engineer, and manufacturer of wireless and electrical apparatus, etc., carried on by J. L. Harvey, both in High Street, Swadlincote, Derby. The first directors are: W. Jones, The Grove, Swadlincote, music seller; J. L. Harvey, 32, High Street, Swadlincote, electrical engineer. Registered office: 32, High Street, Swadlincote.

Convertible Gramophone (Parent) Co., Ltd.—Private company. Registered July 25th. Capital, £5,600 in 5,000 7½ per cent. participating preference shares of £1 each and 12,000 deferred ordinary shares of 1s. each. Objects: To acquire any inventions relating to the recording and reproduction of speech and other sounds, or their wireless reception and transmission, and any method or process of manufacture of gramophones, phonographs or any combinations thereof; and to carry on the business of electricians, wireless, electrical and mechanical engineers, etc. The directors are: W. H. Sadgrove (chairman), Old Street, E.C.2 (managing director Sadgrove & Co., Ltd.); A. F. Green, 100/106, Moorgate Station Chambers, E.C.2; R. St. J. Hall (managing director), 20, Clarence Street, Kingston-on-Thames. Registered office: 100/106, Moorgate Station Chambers, E.C.2.

Leeds Fan & Blower Co., Ltd.—Private company. Registered July 19th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical, mechanical, automobile and hydraulic engineers, haulage contractors, manufacturers of motors, fans, blowers, control gear, refrigerators, installers of electrical apparatus and erectors of electrical plant, etc. The directors are: T. J. Nesbitt, 554, Scott Hall Road, Chapel Allerton, Leeds, accountant's clerk; N. Hill, 9, Park Spring Gardens, Bramley, Leeds, accountant's clerk. Secretary: T. J. Nesbitt. Registered office: School Close Mills, Neville Street, Leeds.

Radiovolt, Ltd.—Private company. Registered July 25th. Capital, £600 in 5s. shares. Objects: To carry on the business of manufacturers of and dealers in battery eliminators for use in wireless apparatus, and all other purposes, wireless receiving and transmitting sets and all accessories thereto, electrical apparatus, &c. The first directors are: L. F. Savage, 198, St. Leonard's Road, East Sheen, S.W.14, optician; E. H. Wright, "Limberlost," Coppice Drive, Wraysbury (life directors). Registered office: 20, Old Compton Street, W.1.

Lustre Electric Lamps, Ltd.—Private company. Registered July 27th. Capital, £600 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless, telegraphic and telephonic apparatus, valves and instruments, incandescent electric lamps and holders, manufacturers and moulders of glass for bulbs, tubing, rods, &c. The directors are: L. C. Richards, 9, Malmesbury Road, E.3, accountant; H. E. Smith, 24, Woodriffe Road, E.11, company secretary. Secretary: L. C. Richards. Registered office: Walter House, 418/422 Strand, W.C.

Official Returns of Electrical Companies.

Alfred H. Hughes & Co., Ltd.—Mortgage debenture dated June 26th, 1929, to secure £1,000 charged on the company's undertaking and property, present and future, including uncalled capital. Holder: A. H. Spalton, 25, Wellington Street, Sheffield.

Salisbury Electric Light and Supply Co., Ltd.—Capital, £125,000 in £1 shares. Return dated April 2nd, 1929. 100,000 shares taken up. £97,500 paid. £2,500 considered as paid. Mortgages and charges: £15,700. Return of allotments, made up to April 16th, 1929, shows a further 10,000 shares allotted, payable in cash, and fully called up.

Steatite and Porcelain Products, Ltd.—Mortgage dated July 3rd, 1929, to secure £16,577, charged on certain land in Stourport. Holders: Stourport Urban District Council.

Magnoid (Bristol), Ltd.—Capital, £1,000 in 600 preference and 400 ordinary shares of £1 each. Return dated March 25th, 1929. All shares taken up. £400 paid on the ordinary shares. £600 considered as paid on the preference shares. Mortgages and charges, nil.

Wilfrid Francis & Co., Ltd.—Capital, £1,000 in £1 shares. Return dated March 19th, 1929. 490 shares taken up. £490 paid. Mortgages and charges, nil.

Wellingborough Electric Supply Co., Ltd.—Capital, £50,000, in £10 shares. Return dated March 26th, 1929. 4,500 shares taken up. £45,000 paid. Mortgages and charges: £17,500.

Northallerton Electric Light & Power Co., Ltd.—Capital, £6,500 in 2,900 preference shares of £1 each and 12,000 ordinary shares of 6s. each. Return dated March 22nd, 1929. 1,161 preference and 11,415 ordinary shares taken up. £4,585 10s. paid. Mortgages and charges: £3,900.

Yarmouth (I.W.) Electricity Supply Co., Ltd.—Capital, £5,000 in £5 shares. Return dated March 29th, 1929. 361 shares taken up. £1,805 paid. Mortgages and charges, nil.

Joseph Evans & Sons (Wolverhampton), Ltd.—Capital, £125,000 in £1 shares. Return dated January 14th (filed February 6th), 1929. 113,508 shares taken up. £13,508 paid. £100,000 considered as paid. Mortgages and charges, £43,000.

Johnson & Foster, Ltd.—Capital, £1,000 in £1 shares. Return dated February 15th (filed March 18th), 1929. 300 shares taken up. £300 considered as paid. Mortgages and charges, nil.

Central Electric Development Co., Ltd.—Capital, £2,000 in 500 preference and 1,500 ordinary shares of £1 each. Return dated December 31st, 1928 (filed April 5th, 1929). 160 preference and 1,500 ordinary shares taken up. £1,560 paid on 160 preference and £1,400 ordinary shares. £100 considered as paid on 100 ordinary shares. Mortgages and charges, nil.

Mexican Hydro-Electric Development Syndicate, Ltd.—Issue on June 13th, 1929, of £250 debentures, part of a series already registered.

General Cable Manufacturing Co., Ltd.—Satisfaction to the extent of £1,600 on July 1st, 1929, of debentures dated June 30th, 1928, securing £41,400.

Radio Service (London), Ltd.—Satisfaction in full on May 17th, 1929, of second debentures dated August 15th, 1927, securing £1,500.

Debenture dated July 16th, 1929, to secure £1,500, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: G. D. Le Lievre, 105, Torriano Avenue, N.W.5.

Simmonds & Stokes, Ltd.—Satisfaction to the extent of £3,000 (balance) on February 15th, 1928, of debentures dated April 15th, 1924, securing £7,000. (Notice filed July 17th, 1929.)

Chesham Electric Light & Power Co., Ltd.—Capital, £125,000 in £1 shares. Return dated March 7th, 1929. 95,000 shares taken up. £80,000 paid. £15,000 considered as paid. Mortgages and charges, nil.

Gent & Co., Ltd.—Capital, £50,000 in 20,000 preference and 30,000 ordinary shares of £1 each. Return dated March 14th, 1929. 4,427 preference and 20,876 ordinary shares taken up. £6,887 paid on 957 preference and 5,930 ordinary shares. £18,416 considered as paid on 3,470 preference and 14,946 ordinary shares. Mortgages and charges, £16,500.

Leatherhead & District Electricity Co., Ltd.—Capital, £130,000 in 80,000 ordinary, 25,000 preference and 25,000 "B" preference shares of £1 each. Return dated March 28th, 1929. 74,226 ordinary, 25,000 preference and 16,970 "B" preference shares taken up. £116,196 paid. Mortgages and charges, £91,550. Returns of allotments, made up to June 12th, 1929, show a further 5,774 ordinary and 8,030 "B" preference shares allotted, payable in cash and fully called up.

Beck & Moss, Ltd.—Capital, £2,500 in £1 shares. Return dated March 30th (filed May 1st), 1929. All shares taken up. £525 paid. £1,975 considered as paid. Mortgages and charges, nil.

Smithfield Markets Electric Supply Co., Ltd.—Capital, £100,000 in 8,000 ordinary shares of £5 each and 60,000 ordinary shares of £1 each. Return dated March 13th, 1929. 60,000 £1 ordinary shares taken up. £60,000 paid. Mortgages and charges, £12,540.

British Columbia Electric Railway Co., Ltd.—Capital, £6,320,000 in £1,440,000 5 per cent. cumulative perpetual preference stock, £1,440,000 preferred ordinary stock, £2,406,103 deferred ordinary stock and 1,033,897 unissued shares of £1 each. Return dated January 14th (filed April 25th), 1929. All stock taken up. £5,086,104 15s. paid. £200,000 considered as paid. Mortgages and charges, £3,608,710.

Edward Wilcox & Co., Ltd.—Capital, £2,000 in 1,000 preference and 1,000 ordinary shares of £1 each. Return dated September 18th, 1928 (filed April 17th, 1929). 1,000 ordinary and 600 preference shares taken up. £1,163 7s. 6d. paid (being £1 per share on 600 preference and 501 ordinary and 2s. 6d. per share on 499 ordinary shares). Mortgages and charges: £500.

W. E. Dove & Co., Ltd.—Capital, £3,500 in £1 shares. Return dated March 4th, 1929. 320 shares taken up. £2,000 paid. £1,200 considered as paid. Mortgages and charges: £800.

Thrissell Engineering Co., Ltd.—Capital, £150,000 in 10s. shares. Return dated May 16th, 1929. 195,409 shares taken up. £90,673 10s. paid on 181,347 shares. £7,031 considered as paid on 14,062 shares. Mortgages and charges, nil.

Central Sussex Electricity, Ltd. (formerly Haywards Heath and District Electric Supply Co., Ltd.)—Capital, £30,000 in £1 shares. Return dated June 26th, 1929. 20,000 shares taken up. £20,000 paid. Mortgages and charges, nil.

Mather & Platt, Ltd.—Capital, £2,500,000 in 40,000 preference shares of £10 each and 2,100,000 ordinary shares of £1 each. Return dated March 13th, 1929. 40,000 preference and 1,363,660 ordinary shares taken up. £630,660 paid on 29,200 preference and 338,660 ordinary shares. £1,133,000 considered as paid on 10,800 preference and 1,025,000 ordinary shares. Mortgages and charges, nil.

Electro-Mechanical Supplies, Ltd.—Capital, £3,000 in £1 shares. Return dated January 14th (filed March 6th, 1929). 999 shares taken up. £999 paid. Mortgages and charges, nil.

G. Haslam & Co., Ltd.—Capital, £2,000 in £1 shares. Return dated November 26th, 1928 (filed April 6th, 1929). 1,712 shares taken up. £512 paid. £1,200 considered as paid. Mortgages and charges, nil.

City Notes.

Victoria Falls and Transvaal Power Co., Ltd.

The annual meeting of the company was held on July 25th, the chairman, the Marquess of Winchester, presiding. In presenting the report (Elec. Rev., July 19th, p. 122), the chairman referred to the recent death of Sir Charles Metcalfe, one of the company's original directors. Dealing with the accounts, he said that the reserve fund now stood at £550,000, and the directors intended to augment it in future years. Referring to the company's contract with the Rand Mines Power Supply Co., Ltd., he said that the whole of the contracts for the supply of power since the end of 1922 had been entered into between the consumers and the Victoria Falls Co., and the latter company had the entire use and benefit of the Rand Co.'s plant and retained the whole of the revenue derived from the sale of power therefrom. In return, the company undertook to meet all expenses and keep the plant in good order. The work at Witbank, for which the company had been financing the Electricity Supply Commission, was nearing completion. The latest extension to Witbank was being financed by the Commission itself. The chairman said that during the past year the demand for power by the gold-mining industry had showed a gradual and steady increase, reaching a total of 300,000 h.p., and there were outstanding notifications for further power. They felt confident that any loss of load caused by the exhaustion of old mines would be compensated for by new mining developments. A fifth 20,000-kW set was on order for the Witbank station, which the company operated; that would bring the station up to its full designed capacity of 100,000 kW. For the Brakpan station they had on order a new 20,000-kW set to replace a smaller set there; they had also ordered a 32,000-kW set and boiler plant for the Vereeniging station. The extension to the latter station was being designed to permit of the installation of a second similar set should this become necessary. Negotiations regarding the company's rights at Victoria Falls were still proceeding. While the possible need of power from the Falls for the electrolytic refining of copper produced in Northern Rhodesia had not been lost sight of, it had been made clear that there was no prospect of any requirements for that purpose in the near future.

W. & T. Avery, Ltd.

Sir J. Fortescue Flannery, Bt. (chairman), presided at the annual meeting on July 23rd, and in the course of his speech referred to the company's oil-pump equipment and its association with the automatic machine business. He said that they were represented in all the Dominions and in all foreign countries and had recently organised their own company in New Zealand—W. & T. Avery (N.Z.), Ltd.; a tried executive had gone out from Birmingham to take charge of that company. Their German associate had improved its works and was extending its activities, and the Spanish company was represented at both the Barcelona and Seville Exhibitions. Through an old-established and important firm the difficult markets from Poland to the Black Sea were being exploited.

At a subsequent extraordinary meeting alterations in the company's articles of association were approved, some of which were made on the recommendation of the London Stock Exchange Committee with a view to the quotation of the company's shares.

Ericsson Companies' Reports.

The L.M. Ericsson Telephone Co. reports favourable results from last year's activities of its affiliated concession companies in Poland and Italy. In Poland the number of telephone subscribers increased during 1928 by about 14 per cent., or from 60,635 to 68,917, while in Italy the number of subscribers rose by 10 per cent, from 21,566 to 23,795. The net profit of the Polish branch increased from 1.05 to 1.59 million kronor (£60,000 to £90,000), and the dividend to the shareholders was raised from 8 per cent. to 10 per cent. The net surplus of the Italian affiliation rose from 3.07 to 4.08 million lire (£9,000 to £12,000), and the dividend was 7 per cent. against 6½ per cent. in the previous year.

Oliver Pell Control, Ltd.

The report for the year ended March last shows a net profit of £8,747, to which is added £3,349 brought forward, making £12,096. After meeting the 8 per cent. preference dividend it was proposed to transfer £1,000 to reserve and £1,500 to special reserve, to pay a dividend of 5 per cent, on the ordinary shares, and carry forward £3,876. The meeting was held on Tuesday last.

Falk, Stadelmann & Co., Ltd.

A profit of £97,708 is reported for the year ended March 21st last. To this is added £3,927 brought forward, making £101,635. The allocations include £10,000 to reserve, and a dividend of 7½ per cent. is to be paid on the ordinary shares. Last year 7½ per cent. was paid in the form of a capitalised bonus.

Dublin United Tramways Co. (1896), Ltd.

The interim dividend on the 6 per cent. preference shares is being paid, but the directors state that in view of the situation disclosed by the past half-year's accounts they do not feel justified in declaring an interim dividend on the ordinary shares. Last year's interim ordinary dividend was 3 per cent.

Imperial Tramways Co., Ltd.

The directors have declared an interim dividend on the ordinary shares at the rate of 4 per cent. for the half-year ended June 30th, 1929.

Charing Cross Electricity Supply Co., Ltd.

The directors have declared a dividend of 9½d. per share on the ordinary shares of the West End Undertakings for the half-year ended June 30th.

Bristol Tramways and Carriage Co., Ltd.

An interim dividend of 4 per cent. has been declared on the ordinary shares for the half-year ended June 30th, against 3 per cent. last year.

Metropolitan Electric Supply Co., Ltd.

An interim dividend at the rate of 6 per cent. per annum has been declared on the ordinary shares, as last year.

City of London Electric Lighting Co., Ltd.

The directors have declared an interim dividend of 1s. per share on the ordinary shares.

Enfield Cable Works, Ltd.

A dividend of 10 per cent. has been declared on the ordinary shares.

City of Buenos Ayres Tramways Co., Ltd.

The usual quarterly dividend of 1s. 3d. per share has been declared.

German-Spanish Company.

The report of the *Siemens-Schuckert Industria Electrica, S.A.*, Madrid, which was formed by the German Siemens concern in 1910, reports that further progress took place in 1928 and the turnover reached a record level. Nevertheless the net profits of 451,000 pesetas were only slightly in excess of those of the previous year, and the dividend remains at 8 per cent. The Spanish works has commenced the manufacture of meters in quantity.

Swiss Companies.

The *Société des Ateliers de Sécheron*, Geneva, has declared a dividend at the rate of 6 per cent. on capital of 4,000,000 fr., as in the three preceding years.

The Brown-Boveri Company reports that the net profits increased from 4.77 million fr. in 1927 to 5.31 millions last year, and the dividend is raised from 8 to 9 per cent., leaving 380,000 fr. to be carried forward.

French Company.

At the recent annual meeting in Paris of the Compagnie Française pour l'Exploitation des Procédés Thomson-Houston it was stated that the company had established large works for the manufacture of radio receiving sets and gramophones.

Stocks and Shares.

Monday Evening.

For years past it has been taken almost for granted in the City that the Bank of England must retain at least 150 million pounds of gold in its Issue Department; and, in the ordinary way, the Bank holds a substantial amount above this assumed minimum. Of late, however, gold has been going out of the country in a manner which has lowered the Bank's stock well below the minimum, with the result that talk has been current every week of a probable rise in the Bank Rate that will stop the efflux of the metal. It is thought that if the Rate goes up, it will be by one per cent., and the prospect of a 6½ per cent. Bank Rate is sufficient to give pause to investment and speculation. This is the principal reason for the depression that has ruled, and which continues to prevail, in a good many of the Stock Exchange markets, affecting first-class stocks, as well as those in the speculative sections, and making itself felt over such front-rank ordinary shares as those of the electricity supply list, as well as the stocks and shares included amongst prior-charge issues.

Bank Rate Apprehensions.

The Chancellor of the Exchequer recently spoke in a vein that suggested the possibility of a rise in the Bank Rate being averted, and, in consequence of this, a mild recovery in prices occurred. It will be observed, however, that the "money" stocks—that is to say, those upon which the Bank Rate has a greater influence than trade itself—are still weak. Five per cent. debenture stocks can be obtained at prices that return 5½ per cent. on the money, though the Central Electricity Board 4 per cent., recently issued at 83, remains at 80, at which the yield is 5 per cent.; and such a sound security as West Midland Joint Electricity Authority 5 per cent. 1948-68 at 100, pays no more than the round 5 per cent. If the Bank Rate were to rise on the Thursday in this week, the prices of gilt-edged stocks could hardly fail to yield ground.

Interim Dividends.

Declaration of interim dividends by the electricity supply companies continues: the Metropolitan Electric Supply interim is at the rate of 6 per cent.; the Charing Cross has declared 9½ per cent. on the ordinary shares of the West-End Undertakings; and the City of London Electric announces a shilling a share. These dividend declarations are in accordance with anticipation, and produced no changes in prices. The group is disposed to be somewhat dull, in consequence of the monetary considerations mentioned in the previous paragraph.

Yields on Shares.

It is pointed out by a correspondent that the yield on City of London Electric ordinary shares is stated in our columns as £4 4s. 9d. per cent., instead of being over 6 per cent., the latter being the actual return available from the purchase of the shares at the present price and at the current rate of dividend. On several previous occasions, however, we have observed that, in the case of most of the London companies, the calculation of the yield is based upon the return which will be available at the end of 1931, when the companies go on to a 7 per cent. standard rate of dividend. Some Stock Exchange people, in sending out their lists, give a double table of return—the yields, that is to say, at the present dividend rate, and, secondly, at that which will come into force on the 7 per cent. basis. Whichever way the matter is treated, there is a possibility of misunderstanding, and, in accordance with the lines already explained here, the austere principle has been adopted of working out the yields on the basis of the 7 per cent. dividends. The standard rate of 7 per cent. dividend applies to companies in regard to what is called their administrative area in the County of London. Where they have interests outside this particular area, the standard dividend will not necessarily apply.

Possible Exceptions.

The County of London, with its big Barking station, the Metropolitan Electric Supply Company, the London Electric, the South London, and the South Metropolitan, are amongst those which embrace areas, or which supply electricity outside the area covered by the Act. The London Company, for instance, supplies the Southern Railway with a good deal of its power. The Charing Cross concession runs for a year later than that of most of the others—that is to say, until 1932. On top of all this, there is at least the possibility that the London companies will be able, when the end of 1931 arrives, to pay an additional dividend to the 7 per cent. under the conditions laid down by the Act, whereby the customers, as well as the shareholders in the companies, must participate in any further benefits. How to explain all these possible variations week by week in connection with a table of prices it is difficult to know, and it may again be repeated that the perhaps ultra-austere method is adopted of taking the standard rate of 7 per cent. dividend and applying it to most of the companies in our weekly list of prices.

Price Changes.

Bournemouth and Poole have lost 1/16, and so have Urban ordinary. Midland Counties gave way to 32s., and Lancashire Light and Power to 28s. 6d. Scottish Power remains at 30s.

Dealings started in the new shares, offered at 28s., on the basis of 3d. premium, but the price stiffened to 7¼d. premium. Northants at 46s. 6d. are steady, and the other changes are generally small, several being caused by the marking of the prices ex dividend. British Power and Light are dullish at 17s. 3d.

Cables and Wireless.

Cables and Wireless stocks have been moving in erratic fashion, the principal fluctuations being those in the company's "B" stock. The price went back to 80 after having been 100¼, and recovered to 87 upon the introduction of the stock to the New York "Kerb" market. This introduction did not have the expected effect of bringing in any rush of American buying, and the price again relapsed, this time to the neighbourhood of 81½, which leaves a small decline on the week. The 5½ per cent. preference stock came into strong investment demand, and moved up from 94½ to 95, the latter being ex the dividend of 1¾ per cent., less tax, deducted from the price last Thursday. The company's 7½ per cent. "A" ordinary stock, which to the speculative investor is thought to present the most hopeful possibilities for appreciation over a period of years, is two points harder at 87. Speculation is concerned more with the "B" stock than with the others. The investor chooses the 5½ per cent. preference; and the man who is prepared to mix a certain amount of risk with the prospect of getting a good yield on his money within a couple of years' time, puts his confidence and capital into the "A" ordinary stock.

American Telephone Spurt.

International Telephone and Telegraph at 112½ is somewhat reactionary, though, on the other hand, American Telephone and Telegraph stock at 275 is 31 points better than it was this time last week. Canadian Marconis eased off to 40s. Dealings in Marconi shares have practically ceased. Marconi Marines changed hands in fairly considerable quantities in the neighbourhood of 3. Vague rumours suggest that the interim dividend is likely to prove satisfactory. Burndept Wireless are dull at 4s., and Telephone Manufacturing remain at 4s. 3d. No changes have occurred in the ordinary or "B" deferred shares of International Automatic Telephones, both remaining at 37s. 6d. Hall Telephone Accessories are quoted at 15s. 3d.

Home Rails and Tractions.

The announcement by the Metropolitan Railway of an interim dividend of 1¼ per cent. on its ordinary stock proved to be in conformity with expectations, but the price of the stock fell back to 57. The dividend is the same as that declared for the previous period a year ago. The dividend on the company's surplus loans stock of 1¼ per cent. is also at the same rate as that of a year ago. The Home Railway market suddenly assumed a brighter aspect owing to interim dividend announcements by the Great Western and the London Midland and Scottish, which greatly surprised even the most ardent supporters of the stocks. These produced temporary rises in the prices. They also led to criticism of the action of directors in declaring dividends well above those of a year ago, the critics contending that this policy is playing into the hands of those who think that railwaymen should be paid more than they are at the present time. London Underground and tramway descriptions have hardly moved. British Electric Traction deferred is 25 points higher at 1,600.

The Dollar Stocks.

Once more the principal excitement in dollar stocks has centred around Hydro-Electrics, where buyers from New York and Montreal declined to be denied, and ran up the price to 63. This is a gain of 9¼ points as compared with last week, and it is due to substantial improvements having occurred in the prices of the American utility stocks and shares, in which the Hydro-Electric Corporation is closely interested. International Holdings rose to 12½, but failed to maintain their full strength, going back to 11¼, at which price there is a gain on the week of about ¾. Shawinigan at 96½ have put on 6 points, and Montreal Light and Power shares at 122 are 3 better, Power Corporation of Canada advancing 5 points to 121½. Brazilian Tractions rose 2 to 63. Further substantial improvements occurred amongst Mexican utilities, the common and the preferred shares of the Light and Power Company both being 5 points up. British Columbia Power "A" shares are 46, and the "B" 29. Calgary Power at 167 is rather lower.

Manufacturing and Equipment.

This section is heavy and depressed. In spite of the popularity enjoyed by some of the Anglo-American shares, Associated Electric ordinary have gone back 3s. 9d. to 41s. 3d., General Electrics at 51s. 3d. are 1/16 down. Amongst other shares which show falls are Siemens at 27s., India Rubber at 13s. 9d., Enfield Cable ordinary at 4¾, and British Insulated at 3¾. The conversion of Brush Electric shares into stock has not saved the price from weakness, as at 132 it shows a fall of 2 points on the week. British Aluminium gave way to 47s. Ever-Ready dipped below £1, but recovered to the round figure.

The rubber share market is somnolent. The iron and steel group remains under the influence of quiet trade, and the uncertainty attaching to labour conditions in the heavy industries.

Share List of Electrical Companies.

	Nom.	Approx. Dividend. 1927.	1928.	Price July 29 1929.	Rise or fall	Yield p.c.
Home Electricity Companies.						
Bournemouth and Poole	£1	15	15	60/6	−1/6	4 19 2
Brompton Ordinary	1	8½	8½	26/-	—	5 7 8
Charing Cross Ordinary	1	8½	8½	26/6	—	5 5 8
do. do. 4½% Pref.	1	4½	4½	17/6	—	5 2 10
Chelsea	1	8¾	8¾	26/-	—	5 7 8
City of London	1		10	39/8	—	4 4 6
do. do. 6% Pref.	1		6	23/-	—	5 4 4
Clyde Valley	1		8	36/3	—	... ...
County of London	1	7½	10	53/-	−1/-	3 15 6
do. do. 6% Pref.	1	6	6	23/-	—	5 4 4
Edmundson's 7% Pref.	1	7	7	24/-	—	5 16 8
Elec. Supply Corporation	1	11	11	39/3	—	4 2 8
Kensington Ordinary	1	8	8	26/-	—	5 7 8
Lancs. Light and Power	1	7½	7½	28/6	−1/-	5 5 3
London Electric	1	8½	9	28/-	−6d.	5 0 0
Metropolitan	1	9	9	43/9	−2/-	4 2 2
do. 4½% Pref.	1	4½	4½	17/6	—	5 2 10
Midland Counties	1	6½	6½	32/-	−1/-	4 0 0
Mid. Elec. Power	1	15	8	37/6	—	4 5 4
Newcastle on-Tyne Ordinary	1	6	6	27/-	—	4 9 0
do. 7% Pref.	1	7	7	26/-	—	5 7 8
Notting Hill 6% Pref.	10	6	6	11	—	5 9 1
North Met. Elec. 6% Pref.	1	6	6	23/-	—	5 4 4
St. James' and Pall Mall	1	8	8	26/6xd	—	5 5 8
Scottish Power	1	8	8	30/-	—	5 6 8
South London	1	8½	8½	26/6	—	5 5 8
Urban Ordinary	1	7	—	37/-	−1/6	... ...
Westminster Ordinary	1	8½	8½	26/-	—	5 7 8
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	24/6	—	6 2 5
Yorkshire Elec.	1	8	8	36/-xd	—	4 9 0
Home Rails.						
Central London Ord. Assented	Stock	4	4	72	—	5 11 1
Metropolitan	"	8	8½	87	−1	6 2 8
do. District	"	4	5	72½xd	—	6 18 0
Underground Electric	£1	5	7	21/6xd	−6d.	6 10 3
do. do. Income	Bonds	6	6	106	−1	5 13 2
Telegraphs and Telephones.						
Anglo-Am. Tel. Pref.	Stock	6	6	108	+1	5 16 6
do. Def.	"	1½	1½	24½	—	6 2 5
Automatic Telephone	1	10	12½	2	—	6 5 0
Cables & Wireless Pref.	Stock	—	—	94½xd	+1	... ..
do. A Ord.	"	—	—	87	+2	... ...
do. B Ord.	"	—	—	81½	−½	... ...
Globe Tel. and T. Ord.	10	10	10	26	−½	*3 17 0
do. do. Pref.	10	6	6	11½	—	5 6 6
Great Northern Tel.	10	20	17½	31	—	5 13 0
Indo-European	25	10	10	49	−1½	*5 2 0
Marconi-Marine	1	12½	15	3	—	5 0 0
Oriental Telephone Ord.	1	12	12	3 1/16	—	... ...
Home and Foreign Trams, &c.						
Anglo-Arg. Trams First Pref.	5	5½	5½	8 7/16	—	8 0 0
do. do. 2nd Pref.	5	6	6	8½	—	8 11 6
do. do. 5% Deb.	Stock	5	5	74½	—	6 14 3
British Electric Traction Def. Ord.	"	5	5	1630	+25	... ...
do. do. Pref. Ord.	"	8	8	128	—	6 5 0
Brazil Traction	100	7	8	63	+2½	3 3 6
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	99½	—	5 5 10
London & Sub. Trac. 5% Pref.	1	Nil	Nil	10/-	—	... ...
London United Tram Deb.	Stock	4	4	59	—	6 15 7
Mexico Trams, 5% Bonds	—	5	5	75	—	6 12 9
Mexican Light Common	100	Nil	Nil	97½	+5	... ...
do. 7% Pref.	100	7	7	81½	+5	8 11 10
do. 1st Bonds	—	5	5	79	−1	6 6 7
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	... ...
Manufacturing Companies.						
Assoc. Elec. Ord.	1	6	—	41/3	−3/16	2 18 3
Babcock & Wilcox	1	18	15	62/6	—	*4 16 0
British Aluminium Ord.	1	10	10	47/-	−1/-	*4 5 1
British Elec. Transformer Pref.	1	7	7	13/9	—	9 6 8
British Insulated Ord.	1	15	15	3¾	−¼	4 0 0
Brush Ord.	Stock	10	10	132	−2	7 10 5
Callenders	1	15	15	3¾	—	4 0 0
do. 6½% Pref.	1	6½	6½	1¾	—	5 4 0
Crompton Parkinson Ord.	5/-	—	—	21	—	... ...
do. 8% Pref.	1	8	—	25/-	—	6 2 5
Edison-Swan 1st Pref.	1	7½	7½	24/6xd	−6d.	7 1 2
do. 5% Deb.	Stock	5	5	84½	—	5 18 4
Electric Construction	1	7½	5½	15/-	—	7 6 8
Enfield Cable Ord.	1	20	20	4¾	−¼	4 11 4
English Electric	1	Nil	Nil	6/9	—	... ...
do. do. Pref.	1	8	Nil	7/6	—	... ...
Gen. Elec. Pref.	1	6½	6½	24/-	—	5 8 4
do. Ord.	1	10	10	2 1/16	−1/16	3 18 4
Henley	1	25	30	6¾	−¼	4 14 4
do. 4½% Pref.	5	4½	4½	4¾	—	5 6 0
India-Rubber		Nil	Nil	13/9	−1/16	... ...
Johnson & Phillips		10	—	36/3	—	5 10 4
Siemens Ord.	1	7½	7½	27/-	−6d.	5 11 1
Telegraph Construction	12	10	10	23½	—	*4 19 3

* Dividends paid free of Income Tax.

Indian Electrical Imports.

Figures for 1927-28 and 1928-29 Compared.

THE following are the figures of the electrical imports into India during the twelve months ended March 31st, 1929. In accordance with our usual practice the comparative figures for 1927-28 are given and the increase or decrease in each item is also shown :—

	1927-28. Thous. Rs.	1928-29. Thous. Rs.	Inc. or dec. Thous. Rs.
Electrical machinery—			
Control and switchgear	3,653	3,044	– 609
Generators, alternators and dynamos	3,807	4,305	+ 498
Motors	3,536	4,500	+ 964
Transformers	1,162	1,091	– 71
Turbo-generator sets	179	600	+ 421
Other electrical machinery ...	7,669	10,151	+2,482
Total	20,005	23,691	+3,686
From United Kingdom ...	16,648	18,539	+1,891
„ Germany	931	1,319	+ 388
„ United States	1,457	2,599	+1,142
„ Other countries	970	1,234	+ 264
Electric fans and parts thereof—			
Total	3,390	3,844	+ 454
From United Kingdom ...	1,834	2,367	+ 533
„ Italy	790	1,034	+ 244
„ United States	188	104	– 84
Electric wires and cables, rubber insulated—			
Total	3,323	3,996	+ 673
From United Kingdom ...	3,125	3,558	+ 433
„ Germany	112	212	+ 100
„ Netherlands	31	108	+ 77
„ United States	33	52	+ 19
Insulations other than rubber—			
Total	3,546	3,037	– 509
From United Kingdom ...	3,125	2,607	– 518
Telegraph and telephone wires and cables—			
Total	72	176	+ 104
From United Kingdom ...	57	166	+ 109
Bare copper wire (electrolytic)—			
Total	2,099	2,725	+ 626
From United Kingdom ...	1,707	2,381	+ 674
All electric wires and cables detailed above—			
Total	9,041	9,934	+ 893
From United Kingdom ...	8,014	8,713	+ 699
„ Germany	367	437	+ 70
„ Netherlands	235	250	+ 15
„ Japan	22	61	+ 39
„ United States	292	346	+ 54
Telegraph and telephone instruments and apparatus—			
Total	588	525	– 63
From United Kingdom ...	492	464	– 28
Electric glow lamps—			
Total	2,593	3,008	+ 415
From United Kingdom ...	676	707	+ 31
„ Germany	214	206	– 8
„ Netherlands	975	1,166	+ 191
Electric lamps (other sorts)—			
Total	942	1,179	+ 237
From United Kingdom ...	114	101	– 13
„ Germany	129	207	+ 78
„ United States	649	711	+ 62
Batteries—			
Total	1,100	1,306	+ 206
From United Kingdom ...	133	189	+ 56
„ United States	660	749	+ 89
Carbons, electric (including furnace electrodes)—			
Total, largely from U.K. ...	122	134	+ 12
Accumulators (including parts)—			
Total	2,220	1,991	– 229
From United Kingdom ...	1,931	1,583	– 348
„ United States	142	343	+ 201
Electric lighting accessories and fittings (including switches)—			
Total	1,555	1,693	+ 138
From United Kingdom ...	1,087	1,266	+ 179
„ Germany	257	278	+ 21
„ United States	161	68	– 93
Electrical instruments (other than telegraphic and telephonic meters)—			
Total	669	728	+ 59
From United Kingdom ...	510	592	+ 82
„ Germany	110	85	– 25
Electrical instruments (other sorts)—			
Total	320	415	– 95
Electromedical apparatus—			
Total	186	371	+ 185
From United Kingdom ...	63	116	+ 53
„ United States	86	150	+ 64
Switchboards—			
Total	500	480	– 20
From United Kingdom ...	488	422	– 66
Unenumerated electrical goods—			
Total	4,674	4,950	+ 276
From United Kingdom ...	2,816	2,891	+ 75
„ Germany	610	671	+ 61
„ Japan	110	150	+ 40
„ United States	965	1,112	+ 147
All electrical instruments and apparatus—			
Total	28,349	31,295	+2,946
From United Kingdom ...	18,516	19,899	+1,383
„ Germany	2,806	3,038	+ 232
„ Netherlands	1,275	1,486	+ 211
„ Italy	845	1,210	+ 365
„ Japan	333	561	+ 228
„ United States	3,540	3,950	+ 410

Danish Trade and Industry.

A Small but Pro-British Market.

IT is stated in a recent D.O.T. report on Denmark by Mr. H. H. Cassells, Commercial Secretary at Copenhagen (Stationery Office, 1s. 6d. net), that the optimism with which 1928 opened was only partially justified during the course of the year. Nevertheless, in spite of adverse factors, the year may prove to be a turning point in Denmark's post-war industrial and economic history. State expenditure has been revised by a Government pledged to economy. It is, however, doubtful whether the financial requirements of the State can be reduced much below their present level, especially in view of the increased foreign borrowing, but there has been no increase in direct taxation. The national economy continues to suffer from the high cost of living. Unemployment remains at a comparatively high level, but a gradual re-absorption of labour is taking place. Wages remain on a higher level, notwithstanding the fall in all other prices since the reintroduction of the gold standard, and are said to be a handicap on industry limiting its capacity to compete both at home and abroad. Great Britain is Denmark's principal customer, but takes third place in the list of suppliers.

Electrical Production and Imports.

Conditions in the iron and steel industries are considered to be better on the whole than they were a year ago. Among the specialist industries with an increased output may be mentioned the production of cement-making plant, ships' refrigerating plant, electric motors, vacuum cleaners, lifts, washing machinery and centrifugals, dairying appliances, stoves, Diesel engines, primary batteries, and electric cables. The past year has been remarkable for an unusually large number of public calls for tenders for power station equipment. In practically every case, however, and especially in electrical equipment, British prices were too high. Mr. Cassells says that the failure of British manufacturers to secure orders from Denmark for electrical equipment is due partly to the fact that requirements are governed by Continental standards which are less exacting than the British, so that the greater proportion of copper in British motors renders them too expensive. An important contract for the supply of electric cables and wire went to Germany, but Great Britain has made progress in the supply of large stationary accumulators.

An appendix to the report shows that during 1928 1,019 metric tons of electrical machinery was exported from Denmark, as compared with 1,428 tons in 1927. The exports of electric batteries and elements amounted to 3,108 tons, against 3,711 tons. In a list of 1928 imports there appear the following three items: Copper rods, plates, tubes, wire, &c., 3,278 tons (against 3,856 tons in 1927); zinc plates, 3,338 tons (against 3,674 tons); and electric cables, 221 tons (against 373 tons).

So far as radio apparatus is concerned, the report states that about 75 per cent. of the receiving sets in use are of Danish manufacture. Imported parts are also used, but the home industry is in a position to supply practically all components excepting valves and loud speakers. The fact that there is an annual import of between 5,000,000 kr. and 6,000,000 kr. of wireless apparatus is principally due to the cheapness of supplies offered by Germany. Holland predominates in the supply of valves; loud speakers, unless they are well advertised, will not be considered by dealers, in view of the many different makes offered. Interest is growing in mains-operated

sets, but high-class sets meet with little demand. British manufacturers are handicapped by high royalties; Danish makers pay only 7½ per cent. upon the sale price.

Notes on Trade.

Mr. Cassells says that Denmark is a circumscribed market, but her Continental neighbours evidently think it worth while to study the country's peculiarities and requirements. British firms appear to consider the market too small or have their eyes directed to larger and wealthier countries. But it seems regrettable that British manufacturers and exporters do not seek to cultivate to a greater extent a market where there are so many points in their favour. There exists a predilection for British goods; the all-round excellence of British products is recognised; the Dane, conscious that Great Britain is his best customer, is inclined to reciprocate; and most Danish business men have an excellent knowledge of English. The goods offered must, however, meet Danish requirements as to taste, style, quality, and price. Denmark is a country, generally speaking, where inexpensive goods are preferred. British producers must recognise and endeavour to meet this fact if they are to increase their share of the Danish import trade. Experience has shown that a careful study of the requirements of the market, initiative and good organisation on the part of British firms have led to improved results, even where the prices of goods were higher than those of competitors. An essential factor in achieving such results is the personality and general suitability of the local representative, backed by comprehension of local conditions and a progressive spirit on the part of the principals. It is becoming increasingly difficult to find responsible trained agents. Another point to be taken into account in the endeavour to increase the British share of the trade is the establishment and maintenance of more intimate personal connections with buyers. In this direction Germany seems to be more active, judging by the number of representatives' licences taken out.

The Hydro-Electric Power Commission of Ontario.

Extracts from the Annual Report for the Year 1928.

THE 21st annual report of the Hydro-Electric Power Commission of the Province of Ontario, covering the year ended October 31st, 1928, recently came to hand. In its 400 odd pages the construction works carried out during the year and the operating results are dealt with exhaustively.

Power for the several electrical systems covered by the Commission is obtained from 22 hydro-electric plants operated by the Commission, supplemented by power purchased from other sources. Throughout the winter of 1927-28, and during the ensuing spring and summer months, work on the initial unit of the transmission line bringing power from the Ottawa river watershed to supplement the supply for the Niagara system was rapidly pushed to completion, with the result that on October 1st, 1928, the line was formally placed in service. It consists of a single-circuit, 220,000-volt line designed to transmit from 125,000 to 150,000 horse power, and extends from a point on the interprovincial boundary on the Ottawa river, where power is received from the Gatineau Power Co., to Leaside, on the outskirts of Toronto, a distance of 202 miles. The steel-reinforced aluminium cable used in this line aggregates 606 wire miles, and is supported by nearly 1,000 steel towers. The completion of this line, much of it through rough and sparsely-populated territory, within so short a period is regarded as a noteworthy engineering achievement. The maximum load (20-min. peak) on the systems up to December, 1928, was 1,070,742 h.p., as against 1,032,500 h.p. up to October, 1928, and 1,000,252 h.p. up to December, 1927.

The total investment of the Commission in power undertakings and hydro-electric railways is $211,217,481, and the investment of the municipalities in distributing systems and other assets is $85,986,288, making in power and hydro-electric railway undertakings a total investment of $297,203,769. The total revenue derived from this capital investment during the year aggregated $36,388,391.

The revenue obtained from the consumers has been more than sufficient to meet the full cost of generating and transmitting the electrical energy, as well as to provide for all operating expenses and the fixed charges of the municipal utility equipments. The Commission collected from the municipal utilities and other customers for power sold a total sum of $24,287,296. This sum was appropriated to meet all the necessary fixed charges and to provide for the expenses of operation and administration. After meeting all charges there was left a net surplus of $940,663.

During the past few years very substantial progress has been made in rural electrification. Practically all rural electrical service is now given through rural power districts, which are operated directly by the Commission. There is now more than $7,200,000 invested in the rural power district systems established by the Commission. Towards this rural work the Ontario Government has, in the form of grants-in-aid, contributed 50 per cent. of the costs of transmission lines and equipment, or about $3,500,000. About 3,790 miles of transmission lines have been constructed to date, of which 929 miles were constructed during the past year. There are now more than 31,000 customers supplied in the rural power districts.

The total reserves of the Commission and the municipal electrical utilities for sinking fund. renewals, contingencies and insurance purposes amount to $76,280,929. The consolidated balance sheet of the municipal electrical utilities shows a total cash balance of $1,342,367, and bonds and other investments of $1,837,140. The total surplus in the municipal books now amounts to $26,514,670, in addition to a depreciation reserve and sundry other reserves aggregating $12,258,053.

The growth of load has been encouraging and indicative of good industrial conditions. Peak loads on every system show an increase over the previous year, and the total energy used was greater on all systems, except the Thunder Bay system, where the closing down of large mills materially reduced the total load for the year. The total output of the Commission, excluding any exported power, increased during the year by 310,000,000 kWh. Compared with the previous year's increases the figures appear even more favourable, particularly on the Georgian Bay system, where last year's increase was 9,460,000 kWh, compared with the previous year's increase of 2,970,000 kWh; on the Central Ontario system, where the year's increase was 16,420,000 kWh, against the previous year's 4,780,000 kWh; and on the Niagara system, where the year's increase was 283,900,000 kWh, compared with the previous year's figure of 135,300,000 kWh. The table of total power generated and purchased shows that the energy generated by the Commission's plants during the year under review reached 4,104,000,000 kWh, an increase in the year of 200,000,000 kWh. The energy purchased during the year increased from 201,000,000 to 236,000,000 kWh, an increase of 35,000,000 kWh. Out of this increase in purchased power, about 5,600,000 kWh was required for the Ottawa system and 5,700,000 for the St. Lawrence system, representing the increased load on these systems above the previous year, both of the systems being entirely dependent on purchased power to take care of any growth in the load. The balance was mainly for the Niagara system, in this case representing only a small portion of the growth of the load on the system, which, exclusive of export power, amounted to 283,900,000 kWh. The Georgian Bay system required an increased supply from outside sources of 1,640,000 kWh, the system's own generating plants increasing their output by 7,820,000 kWh, to take care of the growth of load on the system.

Activities during the year in the Hydraulic Department included the inception of construction work on two new power developments, namely, those at Trethewey Falls and Elliott Chute, which, although of small capacity, are of importance in their relation to the systems in which they are located. The investigation of these, and other possible developments to give the service for which they were designed, had extended over a number of previous years, and throughout there has been careful study of future conditions and suitable additional sources of energy. In the Niagara district, bridge construction, reconstruction of an ice chute, and certain other items of reconstruction and repair constituted the physical work undertaken. In addition to this, however, attention has been given to matters in connection with diversion of water, future load requirements, and completion of the Queenston plant by the addition of the tenth unit. The Commission, at the request of the Provincial Government, is handling the design and supervision of construction of a dam at the outlet of Lac Seul on the English river.

During the year the Transmission Department of the Commission's organisation has been exceptionally busy. The chief construction work has been in connection with the 220,000-V transmission line bringing power from the Gatineau river to the Niagara system at Toronto, and with the transmission lines designed to convey Gatineau river power to the eastern systems of the Commission, namely, the St. Lawrence, Rideau, Ottawa and Central Ontario and Trent systems. Elsewhere, additions to steel-tower and wood-pole lines have been completed, and studies involving design and economics have been made in preparation for new construction.

The Commission records show that within the past year

a surprisingly large number of fuel burners and refrigerators have been installed in all parts of the Province, more particularly refrigerators. Several of the large ice cream manufacturers supply their customers with refrigerators for the purpose of keeping their ice cream at an even temperature at all times. These refrigerators are owned and maintained by the ice-cream manufacturers and are supplied to their customers on a small yearly rental basis. During the past year one ice-cream manufacturer has supplied and installed over 400 of these refrigerators in all parts of the Province where electric service is available. Commencing in the early spring a general inspection was made of all churches in the Province. In a great number of instances it was found that, through wear and tear, and alterations and additions, which had been made by unqualified persons, the electrical wiring and equipment was in need of thorough overhauling. Up to the present time the Department has been successful in having over 80 per cent. of these condemned installations brought up to a reasonable standard, and in having all life and fire hazards entirely eliminated. In many cases these buildings have been completely re-wired.

The Canadian Electrical Code, which was published by the Canadian Engineering Standards Association in 1927, was adopted by the Hydro-Electric Power Commission as the eighth edition of its rules and regulations, and became effective on May 1st of this year. The Canadian Electrical Code has also been adopted by the Provinces of British Columbia, Saskatchewan, Quebec, and Nova Scotia, and it is expected that several other provinces will follow suit in 1929, or as soon as legislation can be enacted. When this has been done there will be one standard code of rules and regulations governing electrical installations throughout the Dominion of Canada.

City Refuse Disposal.

A summary of the advances made in the application of electrical engineering to modern cleansing work, particularly in the City of Birmingham.

By C. L. O'SHAUGHNESSY, D.S.O.

(*Extracts from a paper read at the* BLACKPOOL ANNUAL CONFERENCE *of the* INSTITUTE OF PUBLIC CLEANSING.)

THE soundest method of disposing of a city's house refuse is by incineration, which method produces a large quantity of heat, and the logical sequence is the installation of a boiler to convert the heat from incineration into steam. Such a valuable source of power is not to be wasted, and in Birmingham it was decided to convert the major portion into electrical power, with such steam reservation as was necessary for steam jets, boiler feed pumps, organic utilisation plant, drying rooms, cooking for canteens, and heating buildings. Previously the forced-draught fans and other machinery had been driven by steam power, and a certain amount of electricity was generated for lighting. In view of the proposed extended use of electric vehicles, the batteries of which would mainly be charged at night when the remainder of the machinery was not in use, it was realised that sufficient power was available to generate electricity for charging the vehicles; during the day, the power plant could be used for driving the works machinery. The question of converting all the heat energy from the refuse into electrical energy and supplying it to the mains of the City Electricity Supply Department can only be settled by due consideration of the local conditions.

A commencement was made at the Montague Street works, where the City Electricity Supply Department's energy was delivered at 440 volts d.c., and it was decided to generate a similar supply. Two 100-kW steam-driven generators were installed, and a motor-generator set of 75 kW capacity for converting into 110 volts for charging the vehicle batteries, but the loss in efficiency in conversion, which was of the order of 25 per cent., was a serious matter. At the Lifford works, where no electricity from outside sources was obtainable, the current was, and is still, generated for charging vehicle batteries and for lighting at 110 volts d.c. It was decided to employ a five-wire balancer to give 110 volts between each consecutive pair of wires taken from common point tappings between the four armatures of the balancer, which is a very efficient method of low capital cost. The system is capable of charging any number of batteries, the limiting factor being the size of the main cables supplying the garage. The efficiency improves with the number of batteries to be charged, and for 20 vehicles gives about 98 per cent. as against 75 per cent. with the motor generator.

With regard to charging equipment and its arrangement, experience has proved that the use of fuses is not economical in maintenance. The additional cost of circuit breakers is amply repaid by the rapidity with which a circuit can be opened and closed again after the fault is cleared without damage to batteries or plant.

The progressive use of the electric vehicle in cleansing work, to which it is particularly adapted, has called for vigorous efforts on the part of the makers of other types of mechanically-propelled vehicles. The efficiency of the electric vehicle, combined with its ease of control, still gives it pre-eminence in this field, and the cost of power is not so subject to fluctuation as is the case with the petrol. It is quite sufficient to note that the number of electric vehicles being employed for cleansing work is steadily increasing.

One of the most striking pieces of apparatus in modern refuse-disposal plant is the electro-magnetic separator of iron and steel from the refuse. Whether the object is to separate the magnetic material for its value as a marketable product, or to protect machinery which would be damaged by the presence of pieces of iron, or to produce a resultant material free from iron, or a combination of all these objects, the magnetic separator is an essential part of the handling plant, and the particular requirements of salvage work have produced such improvements in design that other fields of industry have been quick to take advantage of it.

The only type used with success in handling house refuse up to 1923 was the pulley type, which was not efficient owing to the magnetic material often being swept out of the magnetic field by the heavy rush of non-magnetic material falling from the belt. The confined space in the interior of the drum limited very considerably the coil-winding space and made it impossible further to strengthen the field to overcome this fault. Moreover, the separator rotated and the introduction of the current by leads through the shaft, or by brush gear, possessed all the disadvantages attached to those particular forms of gear.

At the Brookvale Road works rotary screens were being installed, and it was suggested by the Salvage Department that an additional brass dead-plate ring be added to the screen at the delivery end and surrounded by an arc-shaped electro-magnet. The makers immediately considered a separator designed on these lines. Although it was a more costly machine, its added advantages in being stationary, the increased space allowed for coil windings and the consequent increase in magnetic field strength, and its more efficient separation of the iron content of refuse, very quickly caused this type of separator to be adopted, and it is now used in practically all modern refuse salvage plant. The first three constructed were installed at the Brookvale Road works in 1923 and, up to date, they have cost practically nothing in repairs. The original is an electro-magnet with arc-shaped pole pieces, which are practically semi-circular and envelop the brass extension cylinder of the revolving screen. The magnet extends from the base to the uppermost portion on the vertical centre line. The separator consists of enclosed magnet units, the wire being wound in the form of coils on insulated metal spools fixed on cores of high-permeability steel. The magnetic flux produced passes through the arc-shaped pole pieces at each end of the core, through the brass extension piece, and penetrates well into the screen through which the material is being led. Parallel to the axis of the screen and fixed on the inside of the brass ring, are fitted a number of slats of non-magnetic iron, each of which, in turn, has attached to it a number of cast feelers of Swedish soft iron, of suitable shape. These feelers, when passing in the vicinity of the magnetic field, become magnets by induction and also serve to comb through the material under treatment. Tins and iron are therefore attracted and held by the feelers, which, in turn, during the revolution of the screen, carry such articles to the top position, where by means of adjustable magnetic throw-off fingers, one on each pole-piece, the articles are automatically thrown off, without the aid of a mechanical brush or wiper, into a chute which diverts them to a conveyor belt and so to the baling plant.

The main advantages of this type of separator are: (1) no bearings, or collector gear, to wear out; (2) material extracted is freer from non-magnetic material; (3) percentage of extraction, relative to pulley type, is considerably higher.

The same principle of separation has been applied to clinker screens at the instigation of the Birmingham Salvage Department, but in this case the separator is smaller and placed at the entrance to the screen, not at the exit. One of the latest improvements is the splitting of the magnet into two quadrant-shaped magnets, which still form a semi-circular shaped separator. The two quadrants allow much easier and closer adjustment of the separator to the screen and allow for adjustment to the screen itself.

The controller of the electro-magnetic separators is also interesting. The electro-magnetic circuit is highly inductive and it would be very dangerous to the machine suddenly to interrupt currents of the order of the normal working current. As the source of supply sometimes fails for reasons beyond control, the magnetic separator is excited by a shunt current, the

coil windings being shunted across the non-inductive resistance used in the controller. At no period during the movement of the controller handle is the magnet-coil circuit broken, and if by any mischance the current from the mains should fail, the magnet coils will discharge their induced current through the controller resistance.

Some people are apt to regard the initial cost of an article as the only cost worth considering, but it is of the utmost importance to take into consideration the maintenance costs also, which remark applies with particular force to the type of motor to be used in refuse handling, where one has to contend with an atmosphere which is often highly charged with dust of a particularly gritty nature. The totally-enclosed motor is proof against dust troubles and, moreover, is also proof against our old destructor friend, the rat. The higher initial cost of the totally-enclosed motor is well worth while in the long run. The author would recommend without hesitation the use of ball bearings in preference to journal bearings. The facility with which the ball-bearing can be made dust proof is a very great recommendation in its favour, the method of lubrication is positive, and when the bearing commences to give trouble it is at once obvious; also standardisation of ball bearings makes replacement a matter of minutes instead of hours in the case of the journal bearing.

The choice of a suitable starting panel is of importance, and the remarks in the previous section on motors also apply in this case. A switch and fuses on a starting panel are just isolating devices, and cannot be regarded as protection for the motor. A double-pole circuit breaker of a good reliable make, fitted with at least two automatic features, overload and no-volt releases, although it costs twice or three times as much as a switch and fuses, repays the outlay many times over in maintenance repairs. Another strong point in favour of the circuit breaker is the ease with which the motor may be stopped from any number of distant positions, or it may be controlled by the stoppage of another motor; the latter is a very useful arrangement when, say, a conveyor is feeding another machine and it is required to hold up the conveyor if the other machine ceases to work. A hand-operated motor starter in the care of an unskilled person can do a lot of damage: a similar starter fitted with some slow-motion device is a better proposition, while an automatic contactor controlled by a push-button switch is still better. On account of the time-interval control between the various resistance steps, giving uniformity of starting, the motor will run for years without trouble. In the case of a group of automatic starters installed in 1921, not one of the eight motors or starters has caused the slightest anxiety, or need for repairs, even though some of them have been worked at the rate of over 100 starts per hour. Each fortnight the cleaner takes off the covers of the motors to clean the dust from brush gear, to see to the bearings, and to watch the operation of the starter with its cover removed; apart from this they have required no attention whatever.

A careful check is kept on the total electrical output from the generators, as well as the supply delivered to various auxiliary services, such as each battery-charging panel, or to any particular machine or process unit. From the records "tell-tale" graphs are compiled weekly, so that we obtain full information about the performance of the steam-raising and electrical plant, not only telling us how much electrical energy is generated, but also how that energy is used. We are able also in this way to compare the performance at any one works with that at another.

The E.A.W. Conference.

A report of the proceedings and social functions of the fourth annual conference at Newcastle.

(*Concluded from page* 151.)

The Progress of Electricity in Holland.

(With Special Reference to Amsterdam).

By Mrs. B. Muller Loftus.

(*Abstract.*)

TWENTY years ago electric light was considered a luxury in Holland. To-day 95 per cent. of the homes in Amsterdam (population 700,000) have electric light; as a result of free installation, up to twelve points, the electricity used in homes (apart from lighting) is very little less than that taken by industry. This position is due to low rates and reliable apparatus. The low rates were inspired by Mr. A. H. Seabrook, who in 1911 first made domestic electricity possible by his "point-five" tariff in Marylebone.

In Amsterdam electricity is supplied by the municipality. The domestic tariff is based on a normal consumption for lighting at 4d. per kWh, and all in excess at 0.8d. per kWh. The monthly fixed charge is calculated according to floor space with the aid of curves. Consumers under this tariff trebled their consumption, and the addition of water-heating at night has resulted in their consumption being doubled again.

Closed coal stoves or central-heating are largely used for warming rooms, but a large number of electric radiators is in use, chiefly in spring and autumn. The municipal shop sells about 5,000 electric radiators every year. On one cold day last February 288,000 units more were used than on a day in October with similar lighting conditions, when the temperature was very much higher. Some kitchen ranges in Amsterdam combine gas rings with an electric oven. Water heating is carried out between 10.30 p.m. and 7.30 a.m., the control being automatic. No cold water runs in during the day, so the water keeps its temperature of 185 deg. F. almost to the last drop. In the last three years 2,300 of these tanks (which can be hired) have been placed with so much success that it is expected the number will reach 7,000 by the end of this year. The charge for this purpose is 0.4d. per kWh. Only 0.7 kWh is necessary to heat the 1¼ gallons per head daily required in the kitchen. Vacuum cleaners can now be bought for £8 on the easy-payment system, and take 20 units per annum each; 70,000 are in use.

About 200 public clocks, driven by three-watt synchronous motors, are to be installed. The sterilisation of milk by electricity is being developed in Amsterdam. Considerable reductions in prices may be anticipated in the future.

Luncheon (July 11th).

Mrs. Wilfrid Ashley presided, and proposed "The King."

The toast of "Success to Newcastle and the North-East Coast Exhibition" was proposed by Lady Brooks, C.B.E., J.P., who has been three times Lady Mayoress of Birmingham. Lady Brooks referred to the Exhibtion as "an extraordinarily plucky effort to re-establish trade conditions." She referred also to the large part played by the director of the E.A.W. (Miss C. Haslett) in making the Association the important body it was becoming.

The Lord Mayor responded on behalf of Newcastle and the Exhibition authorities, and put the gathering into the best of humours by telling stories in the Tyneside dialect. It was very satisfactory to hear from him that the success of the North-East Coast Exhibition had exceeded expectations.

Mr. R. P. Sloan, C.B.E., proposed "The E.A.W.," and specially mentioned *The Electrical Age for Women* as an "age" which one could always talk about, and a magazine which he always found most interesting. He advocated making a country fit for housewives to live in. The difference between generating cost and selling price of electricity was similar to the difference between the cost of filling one's own pail at the reservoir and taking it from the tap in the house. He deprecated uncommercial charges for lighting only, as a disservice to those consumers who were entitled to low rates for making full use of the supply and who ought to be encouraged; they should not have to pay the supply costs of the others. He mentioned that 230 tons of soot per sq. mile per annum fell on the Town Moor. In the worst part of the district the figure was 860 tons. He preferred the expression "electricity supply authority" to "authorised undertaker," as with good workmanship and good apparatus electricity was not dangerous.

Mrs. Wilfrid Ashley responded, and congratulated the North-East Coast on the progressive policy which had been adopted in introducing electricity into the homes. One of the ideals of the Association was to see these advantages available to women all over the country, in the rural districts as well as in the towns. The electrification of an area in Bedfordshire recently arranged should help very materially to show the benefits of electricity. Mrs. Ashley concluded with the advice, "Say it with watts and do it electrically."

In responding to the toast of "The Guests," proposed by Miss Balls, chairman of the North-East Coast Branch of the E.A.W., Mr. L. L. Robinson, borough electrical engineer of Hackney, said he thought the E.A.W. might consider collecting the women's point of view on the question of electricity tariffs in order to help the present position, which was somewhat confusing. He himself was beginning to doubt whether a two-part tariff was the correct one for developing

the uses of electricity. He had worked out for his own undertaking that if he charged 8d. per kWh for two hours per day, he could afford to supply at much below ½d. per kWh for the other 22 hours. He admired the enthusiasm and energy of Miss Holm, Miss Balls, and Mr. Horsfall, and the confidence in the future of Mr. Sloan and Mr. Pinkney.

Led by the Lord Mayor, the company sang the national anthem.

Fourth Annual Report of the Electrical Association for Women.

April, 1928—July, 1929.

Presented on July 12th, 1929, by Miss CAROLINE HASLETT, **Director.** (*Abstract.*)

Since our last annual meeting new branches have been formed in North Wales, Rugby, Hampshire, Swansea and district, Mid-Gloucestershire, North Staffordshire, and Bristol and district. Our total is now 16 branches.

Many other branches are in process of formation throughout the country, and it is expected that the number of branches will be doubled during the coming year.

In passing, I should like to pay tribute to the splendid loyalty and enthusiasm of the officers and committees of our branches, and of the wonderful voluntary work which is being done by these officers.

The London programme has included the following visits:—Ashtead Potteries, Frederick Milner Home, artificial sunlight clinic of Mrs. Godwin, model dairies of the London Wholesale Dairies, Ltd., showrooms of Messrs. Troughton & Young, Ltd., Singer Sewing Machine Co., Ltd., Ideal Home Exhibition (at the invitation of the British Thomson-Houston Co., Ltd.), Belling & Co., Torquay electrical exhibition, Longpark Pottery works, and the showrooms of Battersea Borough Council.

The following lectures were arranged:—"Modern Decorative Lighting of Interiors," by Mr. A. B. Read; "A Five-Course Dinner," by Miss Mabel Collins, at the Soho School of Cookery; the "Electricity (Supply) Act, 1926," by Mr. E. E. Hoadley, M.I.E.E., with Mrs. Wilfrid Ashley in the chair; three lecture-demonstrations in the model electric kitchen on "Electric Cooking," by Mrs. Barnett; "The Commonsense Handling of Domestic Electrical Equipment," by Mr. R. W. Kennedy; and "Domestic Electric Water Heating in Old and New Houses," by Mr. C. C. Hurry; also a lecture-demonstration by Mrs. H. Dover, B.Sc., on the "Thermal Storage Electric Cooker," based on a number of tests carried out by Mrs. Dover in her own home.

On the Women's Day at the I.M.E.A. Conference at Torquay, Miss M. M. Partridge, B.Sc., A.M.I.E.E., gave a lecture on "Women's Work in Connection with Rural Electrification in Devonshire," at which Mrs. Nichols Moore took the chair.

The Committee of Women Demonstrators has held a series of lectures this winter, including such subjects as "Electric Light in Factories as it Affects Production and Hygiene," by Mr. Linguard; "Salesmanship," by Miss Gladys Burlton; "A Complete Electric Radio-Gramophone Equipment," by Mr. H. W. Gambrell; "Publicity," by Miss Norah Miller; "Safety-First Methods in the Electric Home," by Lt.-Col. Vignoles; "How Electricity is Generated at West Ham," by Mr. F. Purse; "Radio Progress," by Mr. Donisthorpe; and "Some Elementary Facts Concerning Electric Motors," by Mr. Bourne. Lectures were given (several by our chairman, Mrs. Hammer) to other organisations. A successful luncheon was held at the Forum Club on March 30th, with a view to arousing the interest of the Women's Institutes on the subject of rural electrification. The Minister of Transport, together with Lady Denman, president of the Women's Institutes, spoke, and Lt.-Col. Vignoles gave a short lecture on the new E.D.A. film, "Country Currents."

During the past year a special series of lectures for cooks has been arranged, and parties of students and domestic science teachers from the British Housewives' Association and other organisations have visited the kitchen for lectures.

The Association is increasingly acting as a link for the placing of women as demonstrators and saleswomen in the electrical industry.

A simple syllabus for training girls in electrical matters has already been brought into operation in one or two schools, but very few schools are equipped with up-to-date electrical appliances on which such instruction could be given.

The committee came to the conclusion that the time was ready for the following action to be taken:—

(*a*) A survey of the domestic electrical equipment which exists in domestic science centres and girls' schools, to discover what training, if any, was given in connection with the matter.

(*b*) To approach the Board of Education with a view to gaining approval for such training to be given in girls' schools, and to offer assistance if necessary with regard to lecturing services.

On June 24th a deputation was received by the Board of Education, which consisted of representatives from practically every section of the teaching world, and also the electrical industry, including the Central Electricity Board. We were fortunate in securing the services of Dr. S. Z. de Ferranti to put the point of view of the industry.

Our journal, *The Electrical Age*, is now entirely self-supporting, and brings in a small revenue.

Evidence has been received that the journal is widely read in many other countries. Extracts from the journal have appeared in many overseas papers. Many libraries subscribe to the journal.

The electrical outlet campaign, which is the biggest single piece of work ever undertaken by the Association, has undoubtedly been a success. Practically all our established branches have held meetings in connection with the campaign, which have been very well attended, and we feel very definitely that after a year's work we have rendered good service in pointing out to electrical authorities, architects, and builders the need for installing more *outlet conveniences* in homes for the future.

We are pleased to find that next autumn an important national campaign will be launched by the Electrical Development Association, based on the preliminary work done by the E.A.W.

Our Headquarters at Kensington Court continue to attract many visitors, including architects, educational authorities, and overseas visitors.

The Social Sub-Committee, under the chairmanship of Mrs. Llewelyn B. Atkinson, continues to hold very successful social afternoons monthly at the club room, one special social having been arranged to raise funds for the Electrical Trades Benevolent Institution.

The one-day conference held in London during April was an unqualified success. Following a council meeting, a large gathering of members met at the Hotel Cecil to hear accounts of the work of the Association The luncheon was presided over by Mrs. Wilfrid Ashley, the speakers including Sir John Snell, Lady Emmott, and Lieut.-Col. Edgcumbe. The day's proceedings concluded with a very enjoyable ball at the Hotel Cecil, the guests being received by the president.

We have been fortunate in getting a good Press throughout the country in connection with all the meetings held by the Association, and we have secured the support of many university and educational authorities throughout the country. Well-known scientific bodies and engineers have co-operated in loaning us the use of their various lecture halls and in giving lecturing services.

We have especially to thank the British Electrical Development Association, among other bodies, for a generous donation, and also Lieut.-Col. Vignoles, the director, and members of his staff, for service and help throughout the year.

Thanks are also due to the men and women who have given us their lecturing services throughout the year, and especially to the E.L.M.A. Lighting Service Bureau for the use of its lecture room.

We have to thank the Provincial Electric Supply Association for the presentation of a set of electric clocks for the club room and offices.

As director, I should like personally to express my own appreciation of the help I have received from many prominent members of the electrical industry and also from our own branches and members.

An Irish Invention.

Mr. McGilligan, Minister for Industry and Commerce in the Irish Free State, has not thrown much light on the invention which, if it fulfills the expectations of its sponsors, will, it is declared, mean much for railway transport. The invention is being financed by the Free State Government. According to Mr. McGilligan it will make possible railway electrification at considerably less than one-tenth of what it would cost under systems now in use. The inventor is Mr. James Drumm, a young National University scientist, who for some years has been engaged at University College, Dublin, on research work in connection with storage of electricity. Last February Mr. McGilligan announced in the Dail that the Government had acquired the patent of an invention from which great benefits to the State were expected. The inventor, he stated, was anxious that the State should gain the benefit. The initial cost was £5,000. He could not at that time disclose the nature of the invention. "I think," he now states, according to the *Morning Post*, "it would be well to say that the invention is at the moment being designed by the inventor with a view to its use on the railways. There is going to be a laboratory test before certain experts in six or seven weeks' time. I have got an agreement from certain people that, if that laboratory test seems satisfactory to them, a test under actual ordinary operation conditions will be carried out. On the experiments carried out to date, and judging from what has been proved with regard to this invention, I can give an estimate of the cost in this way. I am told that the electrification of the main line running between Dublin and Cork under the ordinary conditions of an overhead wire or a third rail would amount to £1,000,000. If this invention works out successfully, giving the best estimate we can make of cost and multiplying it by two, it could be carried out for less than £80,000."

Silver Plating Solutions.

An interesting discussion on the relative merits of sodium cyanide versus potassium cyanide solutions.

(*A report of a meeting of the* ELECTROPLATERS' AND DEPOSITORS' TECHNICAL SOCIETY.)

UNTIL recently potassium cyanide was used exclusively in silver-plating solutions, but within the past year or two its replacement by sodium cyanide, which is considerably cheaper, has been adopted in a number of silver-plating establishments. It has found very wide favour in the United States, but in this country there has existed a rooted prejudice against the use of sodium salt, which is said to result in an inferior electro-deposit. Nevertheless, the potassium salt has now been replaced in a number of important concerns, even in this country, and the use of sodium cyanide is undoubtedly growing.

A very interesting and timely paper on the subject is entitled "A Comparison Between Sodium Cyanide and Potassium Cyanide Silver-plating Solutions," by Dr. E. B. Sanigar. It is the result of work carried out at the University of Sheffield for the Government Electro-Deposition Committee and the British Non-Ferrous Metal Research Association, and it was read before the Electroplaters' and Depositors' Technical Society, in the absence of the author, by Mr. J. W. Perring, and gave rise to an animated discussion. Mr. S. Wernick, M.Sc., hon. secretary of the Society, occupied the chair.

The Paper.

The author said that opinion in England remained divided upon the advisability of using sodium cyanide for silver-plating solutions. Many platers still felt that potassium cyanide was preferable, and among the reasons given to him for the supposed inferiority of the cheaper sodium cyanide were the following:—(1) That sodium cyanide silver-plating solutions gave rougher and coarser crystalline deposits than did potassium cyanide solutions, so that (2) deposits which were easily "finished" were not so readily obtainable from sodium cyanide solutions; (3) sodium argento cyanide deposits could not, therefore, be "finished" without undue loss of silver, whilst (4) the fine finish demanded on Sheffield silver-plated goods could not be obtained from sodium cyanide solutions.

In order to determine whether potassium cyanide had any marked superiority from the point of view of deposit over sodium cyanide, the finishing properties of silver deposits from the two types of solution had been examined. It was thought preferable to have the tests made on trade deposits, and to have the deposits finished by experienced finishers rather than for it to be simply a laboratory comparison. The co-operation of trade platers and trade finishers was secured, and the test carried out on commercial deposits which were plated during ordinary routine work. This resulted in slight differences in plating conditions, although they were, with the exception of the current densities used, very similar.

Experimental Details.—Twenty-four exactly similar spoons, given to the author for the test, were marked and divided into eight sets of three each, and plated along with other work in different sodium and potassium cyanide silver-plating baths, mainly under the author's personal supervision. The conditions during plating were carefully recorded, and the plating solutions analysed for the main constituents.

The "key" to the markings on the spoons was unknown both to finishers and examiners.

The finishers summarised their impressions of the deposits as follows:—

Finisher A.—There was no very big difference between the deposits on burnishing; all were good on lining with no big differences, except 20 and 3, in which cases the difference was due to the deposit; none of them dragged on the dolly with or without oil; all finished nicely.

Finisher B.—None of the deposits dragged on the dolly; no trouble experienced with any of them in the bowl; impossible to distinguish between the sodium and the potassium spoons.

Finisher C.—All finished easily; all were good, and a perfect finish could easily be obtained on them all.

From the average loss of each set the finishing loss, in dwts. per doz. spoons, was calculated for each solution.

The average loss for the whole 24 spoons was 1.884 dwts. per dozen, and of the four sections which lost less than the average, three were plated in sodium cyanide solutions and three were finished in bright vats.

The 24 spoons were then submitted to three independent experienced examiners (each attached to a leading Sheffield silver-plating firm); after careful scrutiny they could not detect any difference (except for "greyness," which appeared in all the potassium spoons) between the deposits or the finishes obtained.

The opinions given by the examiners were:—

Examiner A.—Impossible to tell any difference between the spoons, and none could be selected as inferior to any other.

Examiner B.—Not possible to detect any difference between the two sets of spoons; could not pick out any as worse than the others (apart from grey); the sodium deposits were in no way inferior to the potassium ones.

Examiner C.—No difference between any of them.

Anodes.—Special attention was paid to the anodes (which were removed for inspection) in the sodium argento cyanide solutions. They were not bagged and had a well-defined crystalline structure, being comparable in every respect with good anodes from potassium cyanide solutions. There was no loose powdery surface film on the anodes and no such trouble had been experienced, neither had the users of sodium cyanide experienced any "freezing out" of sodium carbonate. The amounts of sodium carbonate in the solutions were well below the saturation value of the salt at 18 deg. C. (64½ deg. F.).

Current Densities Used.—Of interest was the fact that the current densities used for sodium cyanide solutions were much higher than those used with the potassium solutions. This would seem to be an idiosyncrasy of the platers rather than a property of the solution, for high current densities were also used with potassium cyanide solutions.

A high current density in silver-plating tends to produce a softer deposit, but, up to certain values, usually a coarse deposit. Coarseness of deposit made for high finishing losses. High current density alone did not always produce a coarse-structured silver deposit. The spoons which lost least in finishing were plated at 9 amps. per sq. ft., and practically the whole of deposit was put on in the bright vat. Apart from the comparison in hand, it was interesting to note the effect of "brightening" on the finishing losses. As would be expected from the finer structure and the semi-polish given in a bright vat, brightening tended to lower the finishing losses.

Conclusions.—On the basis of finishing losses, the spoons plated in sodium cyanide solutions were slightly superior (4.5 per cent.) to those plated in potassium cyanide solutions. That margin was hardly sufficient, in view of the differences in plating conditions, to justify the claim that sodium cyanide was distinctly superior to potassium cyanide for silver-plating solutions, but it was adequate to show that the reverse was not true.

The conclusion was therefore drawn that, on the basis of finish obtained and the loss during finishing, there was no appreciable difference between sodium-argento-cyanide and potassium-argento-cyanide solutions.

Discussion.

Mr. S. WERNICK, opening the discussion, said they were indebted to the author for his very interesting paper, the practical value of which was enhanced by the fact that it was the result of work carried out under actual works' conditions in silver-plating establishments, the "home of the silver-plating industry." The results obtained would have been more valuable if, in the first place, a solution containing only sodium cyanide and no potassium cyanide whatever had been used. No doubt economic considerations made that difficult, but, alternatively, it would be useful if the author would give the proportions of sodium and potassium cyanide in the "sodium" bath. Secondly, it was unfortunate that a larger number of samples had not been used. It would have been more convincing if each operator had had more than one sample only from each of the eight kinds of bath to finish.

Mr. S. FIELD welcomed the paper for several reasons: first, as being a record of work carried out under the direction of the Department of Scientific and Industrial Research; secondly, because it was carried out under actual shop conditions. Hardness of the deposit was not affected by the sodium salt, but only by the quantity of free cyanide in the solution. Sodium salts were used largely in America without trouble. The actual difference in the result, as worked out from Dr. Sanigar's figures, was as low as 2 per cent. The fact that satisfactory results were obtained in a solution which had been converted by the addition of sodium cyanide was a convincing argument in favour of its adoption in the trade. There was very little difference between the two cyanides, except for solubility and conductivity.

Mr. S. E. WEILL said that sodium cyanide was actually superior to potassium cyanide in silver solutions. It was not realised that the mixed salt, which was largely used, contained a considerable proportion of the sodium salt; polishing after plating was not really necessary.

Mr. A. ENSOR wished to know the quantity of sodium salt added to the potassium solution, and the length of time it had worked in that condition. The spoons should have been used for some time and their condition reported upon. A hard deposit was not always best, being sometimes brittle and inferior to a soft deposit in wear. His experience of silver

plating from sodium solutions was that it was unsatisfactory.

Mr. D. WEIL, after many years' experience with sodium cyanide solutions, was of the opinion that there were no special difficulties. The author's work showed that the cathode efficiency and the conductivity were satisfactory. The deposit was easily finished, but showed very little finishing loss. There was no doubt that the two cyanide salts were equivalent.

Mr. F. L. JAMES said the drawback to the work was that in reality mixed salts had been used.

Mr. S. E. WEILL said results often depended on the metal content of the solution. Regular analyses should be a more frequent practice.

Mr. L. GORING suggested that metal content did not affect the deposit as much as cyanide content.

A member said he had perfectly satisfactory results with sodium salts over a period of several years' continuous working. It was nevertheless to be regretted that the author had not tried the pure sodium salt alone.

In the unavoidable absence of the author, Mr. J. W. Perring replied to the discussion.

The International Lighthouse Conference.

A report of the proceedings, including the developments and improvements introduced during the past few years in electrical methods of illumination and signalling.

(*Concluded from page* 169.)

DURING the afternoon of July 11th there was a discussion on wireless telephone intercommunication and the distant control by wireless of automatic unattended apparatus.

The CHAIRMAN (Admiral Mansell) said that wireless telephone intercommunication was first introduced into the Trinity House Service in 1923 and was installed primarily for life-saving purposes. Some 40 years ago line-telephone apparatus was installed and submarine cables were laid to various rock lighthouses to establish direct speech communication with the shore. Owing to breakages of the cables wireless telegraphy with spark transmission was introduced in 1908 for shore and light-ship communication, but the crews could never master the Morse code. There were important developments in wireless telephony during and after the 1914-18 European war, and as the result of successful tests with that method of communication Trinity House decided to adopt it, most of the submarine cables and spark transmission wireless apparatus being abandoned. Though primarily installed for life-saving purposes, the value of wireless telephony to the general service soon became apparent. Some lighthouse tenders were equipped and instructions could easily be conveyed to a tender well away from her base, thus effecting considerable saving in steaming time. The wave-length of transmission was 250 metres, but broadcasting interfered with it and experiments were now being carried out with a view to selecting a wave-length which would ensure communication without interference. The Clyde Lighthouse Trustees had carried the uses of wireless telephony a step further and now, as had been mentioned by Mr. A. Stevenson during the morning session, broadcast the sound emitted by a diaphone fog signal by wireless telephony, thus providing synchronous wireless and aerial signals to enable a ship to find her distance from the lighthouse. The Clyde Lighthouse Trustees made use of acetylene fog guns controlled from a distance by wireless, using longer waves, and no doubt other countries were moving in the same direction.

Mr. P. BESSON (France) described experiments which had been carried out between the Chassiron lighthouse, on the Isle of Oléron, and the rock tower at Antioche, 2¼ km. to the north-east, for controlling the automatic working of an acetylene gun fog signal by wireless. Hitherto the signal had been set in operation by the action of a hair hygrometer, but as the hair became salt covered the instrument was found to be insufficiently sensitive. Wireless control employed very short waves (in the region of from three to five metres), and a special transmitter and receiver had been designed for the purpose, the valves of the latter being lighted and extinguished automatically at 10-minute intervals by a clock, thus increasing their life and enabling the fog signal to be put into operation with a maximum delay of that period. The experiments had proved successful, and a permanent installation was being proceeded with. Mr. Besson said that the first wireless beacons were installed in France in 1908, the wave-length adopted being 125 metres. The weak point of that wave, however, was that it was too short to allow of satisfactory reception on board vessels, and only after the adoption of 1,000 metres was it found possible, in 1920 and 1921, to construct a large number of radio beacons from which messages could be received on board vessels. To avoid interruption by neighbouring beacons, it was suggested that special attention should be paid internationally to wave-length, note frequency, and the time intervals at which signals were sent out. It was suggested that the wave-length should be between 950 and 1,000 metres, the note frequency between 700 and 1,600 cycles per second, and the period should be fixed by electric clock, which was the most accurate method available. Trials had already been made on the Atlantic coast with two radio beacons which sent out alternate signals, and it was suggested that the success of this experiment indicated the possibility of arranging a scheme by which there would be non-interference between neighbouring wireless beacons. Since 1924 there had been wireless-telephone communication between Le Havre and lightships on a 600-metre wave-length, and also with commercial vessels, with considerable success, but in order to avoid interruption it would be interesting to experiment with a wave-length of, say, 150 metres. With regard to infra-red rays, he doubted whether, in fog, they would have sufficient penetrative power to reach the required distances. For the complete success of wireless-telephone communication he favoured shorter waves, and mentioned successful experiments carried out last year at Rochelle, which indicated very little interruption with a wave-length of 4 metres. There was no interruption from commercial wireless stations, nor was there anything in the nature of static interference. Another advantage of short waves was the short aerial required. Moreover, the power required was small on account of the high efficiency of the receiving aerial, and as the result of trials with short-wave apparatus permanent apparatus was in course of construction, the results of the working of which he hoped to communicate to the next Conference.

Mr. ALAN STEVENSON spoke of the great value of wireless-telephony in the lighthouse service. With regard to the distant control by wireless of unattended apparatus, he said that the Clyde Trustees had the only apparatus which had yet been in use commercially for assisting navigation, as mentioned by the chairman. The French had since adopted a similar arrangement at Antioche for experimental purposes. The Marconi Co. had provided three sets of apparatus required for the purpose, the wave-length being 125 metres, and as the result of the use of that apparatus certain improvements would be made in later sets. He suggested that the apparatus in use on the Clyde was simpler than that used by the French at Antioche, and it was so arranged that the signal would be fired even if the wireless apparatus should fail.

Mr. J. P. BOWEN (Trinity House) said that 325 metres was first allocated for wireless-telephony in the lighthouse service, but it proved to be so subject to interference from spark transmission from ships that it was soon abandoned and 250 metres adopted instead. Even that, however, was not immune from interference, due to heterodyning by some stations which worked almost exactly on that wave-length, with the result that communication was sometimes impossible. Experiments were now being carried out with 190 metres, and if it proved to be free from interference, then he suggested that those responsible for the allocation of wave-lengths should be approached internationally, so that a band could be reserved for the purpose.

Mr. VAN VLOTEN (Holland) said that after exhaustive tests a band between 185 and 190 metres had been allocated in Holland for wireless-telephone communication for lighthouse service. Thus, in the northern part of Holland the wave-length used was 188 metres, and in the southern part it was 182 metres. At the International Radio Convention it was suggested that a band of from 175 to 200 metres should be reserved, so that each country could select within those limits a wave-length for itself.

Mr. BESSON said he had had no experience of wave-lengths of from 175 to 200 metres. He understood that at the Washington Conference the band between 150 and 200 metres was reserved for amateurs, and it was for that reason that in France a wave-length of from 140 to 150 metres was adopted.

During some general discussion at the conclusion of the Conference it was suggested that committees should be appointed to deal with four main problems, *viz.*, standard wave-lengths for wireless signals, formulæ for light intensity, development of unattended apparatus, and characteristics and time of wireless signals.

Mr. DE ROUVILLE (France), speaking of the serious interference between the wireless beacons in the English Channel and the North Sea, urged that there should be an agreement as to fixed signals, and suggested that France, Great Britain, Belgium, Holland, Germany, and Denmark should discuss the matter.

The Chairman said that Trinity House would be glad to take the initiative.

A number of papers were also submitted to the Conference, the authors of which did not, however, formally present them.

Mr. A. Blondel described a system of position-finding by means of two, or more, submarine sound signals produced by electric oscillators operated by alternating current. The oscillators emitted synchronously sound waves of equal intensity and were fed with currents opposite in phase, so that interference of the sound wave was caused and a nodal plane of silence was produced on the line of approach which the setting of the oscillators was intended to give. By periodically deforming the electric field by varying the relative intensities, or relative phases, of the oscillators, the plane of silence was made to traverse through an arc on either side of the line of approach. In that manner, when off the line, the navigator would hear sound signals intercepted by silent intervals at regular periods, but when on the line the sounds would be heard at double the frequency.

Another paper by Mr. Blondel, in collaboration with Mr. P. Besson, dealt with recent progress in French wireless-beacon stations. The paper recited improvements made in the circuits, valves, control clocks, and other parts of the wireless apparatus. Two types of transmitting apparatus were employed, one working on a continuous wave for long-range direction finding and the other on a modulated continuous wave for short range during fog, of which four such stations would ultimately be established. The remainder, comprising 27 in the complete beacon programme, would be wireless fog-signal stations only and operate on the interrupted-continuous-wave system. All the high-power stations would emit periodically the long-range signals whatever state of weather existed, and some of the short-range fog signals would also be arranged to send out fair-weather transmissions at stated intervals.

A paper from the Atlas-Werke Aktiengesellschaft (Germany) contained data on the comparative ranges of bell and electric oscillator submarine sound signals. The data were based on the results of actual experiments which went to prove the superiority of the oscillator over the bell, and also that the ranges of neither signal were greatly affected by temperature conditions, or that the summer and winter ranges materially differed. The results also indicated a greater range when the sea surface was rough than when smooth, which led the authors to suggest that directive submarine sound signals should be developed in order to avoid interference by sound waves reflected from the sea surface and bottom, instead of allowing the sound to be dispersed in all directions as was now done.

The Netherlands Lighthouse Service presented a paper which detailed recent wireless developments in the Netherlands. A wireless beacon had been installed on the Nordhinder light vessel, both for direction-finding and position giving, synchronous signals being emitted by an electric submarine oscillator for the latter purpose. In order usefully to employ the electric power otherwise dissipated during the periods the oscillator was not sounding, experiments were being carried out with an electric air oscillator to sound in the intervening intervals, but it was foreshadowed that the instrument might not prove as effective an aerial fog signal as the siren now established. Wireless telephones had been installed on light vessels and at shore stations for intercommunication, and a new wireless-telephone transmitter had been developed by the Netherlands Service, together with a broadcast receiver capable of reception on wave-lengths ranging from 100 to 2,060 metres.

During the Conference a telegram of congratulation was sent to Mr. A. Blondel upon being awarded the Kelvin Gold Medal for his lighthouse research work (see Elec. Rev., July 12th, 1929, p. 77).

Mr. D. Alan Stevenson, in amplification of his remarks at the Conference (see p. 169 July 26th issue) has written to us emphasising what is possibly the novel part of the proposal, namely, the use of a talking machine in conjunction with wireless telephony as an aid to navigation, which will be used for the wireless distance and direction beacon at Cumbrae; it is possible that others may see other uses for it in connection with navigation. Two of its advantages in his particular problem are that the mariner will be able to dispense with a stop-watch when finding his distance (and hence avoid inaccuracy in starting it) and that he will avoid dealing with Morse signals, as the proposal offers a new range of characteristics for, say, radio beacons. He points out that "Dr. G. R. Putnam (of America) stated, as we did, to the Conference that the synchronous sound and radio beacon had prospect of preventing collision at sea, if used in conjunction with a ship's own fog horn, and, though dealing with this aspect of the problem is not within our province as lighthouse engineers, it seems worth attention. Although we feel at the moment that this proposal, which my firm is making, offers shipping great advantages in the simplest manner and at low cost, our interest as advisers to many lighthouse authorities lies in seeing that they provide the best system for shipping, whether it be by submarine or sound signalling, or otherwise."

A number of the delegates to the Conference accepted the invitation of the General Electric Co., Ltd., to tour three of its establishments. After inspecting the Osram lamp works at Hammersmith, the party was entertained at luncheon, and later in the day visited the company's research laboratories and glass works at Wembley.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this section.

A Battery Tester.

The increasing development and use of the electric storage battery gives importance to the method of cadmium testing. The cadmium test gives an accurate indication of the state of electric charge of the cell plates, irrespective of terminal potential, and its general use has now been made possible, it is claimed, by means of the "Symplist" cadmium tester, produced by the Ray Manufacturing Co., 25b, High Street, Wimbledon, S.W.19. The cadmium test eliminates the errors of specific gravity or voltage of cell, as it records exactly the condition of plate capacity during the active life of the cell. The "Symplist" cadmium tester is made of high-quality ebonite, in which is contained a "stick" of commercially pure cadmium, the surface of which is such as will ensure a comparatively large area in contact with the electrolyte. The ebonite sheath is removable for cleaning or clearing gas bubbles, and the well-known "Symplist" terminal is incorporated. The testers are sent out complete with v.i.r-asbestos leads, explanatory notes and charts.

An Insulating Liquid for Commutators.

The Martindale Electric Co., Ltd., The Hyde, Hendon, W.9, has recently introduced into this country "Commulac," which is an insulating liquid for painting the slots in undercut commutators to guard against the possibility of short-circuits. The liquid is oil-proof, has a high dielectric strength, and withstands sparking without softening. It is particularly useful in situations in which oil and dirt are present. The liquid is applied with a brush and should be allowed to dry in a temperature of from 70 to 100 deg. F. for about 12 hours, when it becomes glass-hard.

"Mopump" Developments.

We are interested to learn that the "Mopump," a development of Messrs. Rhodes, Brydon & Youatt, Ltd., Waterloo Road, Stockport, which we have already described, is now made in capacities up to 500 gal. per min., pumping against heads up to 100 ft. The pumps have been made vulcanite lined and entirely in stainless steel for special liquors, and the makers have also produced a vertical-spindle pump for unwatering shallow wells and basements. Another development is the "Mopump Minor," fig. 1, which, it is claimed, is so small and easily fixed that it may be placed in any

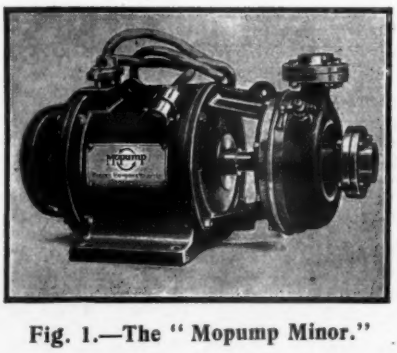


Fig. 1.—The "Mopump Minor."

convenient position, and so highly efficient and economical of power that it may be worked from a country-house lighting set. The current consumption on maximum duty is only 460 watts. The design embodies the salient features of the larger units. A rigid cylindrical casing encloses a short stiff rotor, comprising the motor armature, and a shrouded pump impeller built up on a patented system, with no bearing

inside the pump; the armature spindle does not enter the pump, and is protected from liquid leaking or "creeping." The unit requires no special foundation, and may be handled and fixed just like a small electric motor. The motor is of the "universal" type over a wide range of d.c. and a.c. voltages, and requires no starter. A length of high-quality cab-tire cable is attached securely to the motor by a hardwood split bush and gunmetal flange, and finished off with a plug to fit a standard bayonet lampholder. The motor is of sturdy British design and manufacture. The pump is of special gunmetal throughout, with flanged branches provided with mating flanges tapped ¾ in. for suction and ½ in. for delivery. For handling chemical liquors the pump can be made in cast-iron or special metals to resist corrosive action.

Mercury-Rectifier Anode Cooling.

The SOCIETE ALSACIENNE DE CONSTRUCTIONS MECANIQUES, of Belfort, France, in conjunction with Mr. A. AMILLAC, has recently devised and patented a method of cooling the anodes of mercury rectifiers, with the object of keeping them at the requisite even temperature of about 600 deg. C. The method consists essentially in putting the rear face of the anode in direct contact with a suitable liquid such as mercury, the area of the evaporation surface of which is proportionate to that of the section of the anode. The accompanying drawings, fig. 2, shows diagrammatically the arrangement adopted. The anode is electrically welded at B to the evaporation chamber C, the cooling liquid being contained at E. The pipe D, along which the heated vapour from the mercury, as it becomes heated, passes, is connected with a finned radiator G—which contains a certain quantity of water H—and with an upper radiator I. The anode and its cooling device is supported at J on an insulator K, which in turn rests on the plate F, which forms part of the casing of the rectifier, means being provided at L and M to secure vacuum tightness. The vapours of the mercury, as the latter boils

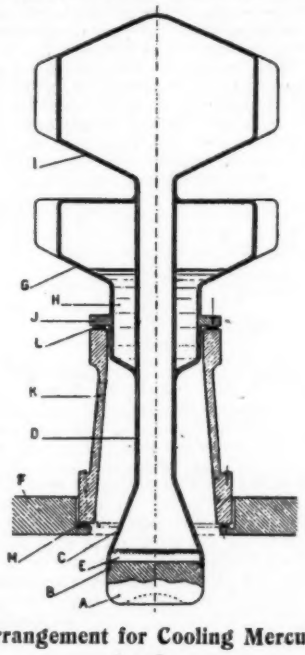


Fig. 2.—Arrangement for Cooling Mercury-Rectifier Anodes.

when the anode is working, rise in the pipe D and are cooled down as they pass through the radiators, the condensed mercury passing back to E along the walls of the pipe D.

A Bell-push Fire Alarm.

We have received a sample of the "Firetee" bell-push fire alarm, a recent production of ELECTRIC LAMP FACTORS, LTD., 41, Rathbone Place, W.1. It embodies a bi-metal strip with suitable contacts, which is designed to short-circuit the push contacts in the event of a dangerous rise of temperature. The device is made in a variety of attractive designs suitable for all schemes of decoration. Normally, of course, the device acts as an ordinary bell push.

"Non-Glare" Glass for Instruments.

The use of a special glass which prevents glare is one of the features of new instruments for switchboards introduced by the GENERAL ELECTRIC CO., of Schenectady, New York, U.S.A. The special glass, in combination with an anti-parallax scale and pointer, facilitates reading regardless of the angle from which the instrument is viewed.

A New Electric Truck.

The latest addition to the range of electric vehicles built by ELECTRICARS, LTD., Lawley Street, Birmingham, is a 3-ton low-loading chassis which can be fitted with either an ordinary lorry or a dust-cart body. The vehicle is designed for a speed of 12 m.p.h. with a full load, and for a range of 45 miles on a single charge of the battery.

A Flame-proof Handlamp.

A distinct departure from the standard practice in the design of handlamps is shown in the new "Wigan" flame-proof handlamp, fig. 3, manufactured by Messrs HEYES AND CO., LTD., Wigan, which has been primarily designed to provide a portable unit for inspection purposes, &c., where explosive atmospheres are liable to occur. It has been tested and approved by Sheffield University for flameproof enclosures in pentane-air and acetone-air mixtures, forming the subject of Report No. 254. The maximum size of lamp that it will

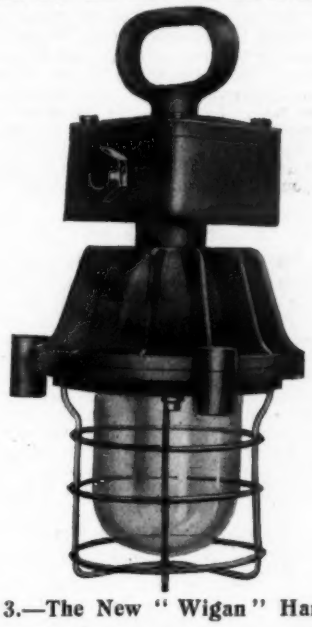


Fig. 3.—The New "Wigan" Handlamp.

accommodate is a 25-watt gasfilled type, and radiating fins are incorporated to assist in the quick dissemination of the heat. The temperature rise, however, is very small, 130 deg. F. only being reached after five hours' burning, attaining this maximum temperature in approximately two hours, with an initial room temperature of 74 deg. F. A substantial welded wire guard with a flat base is fitted, and also a joint box to facilitate wiring and to isolate the well glass portion. The unit is constructed of aluminium alloy, and its net weight is only 4½ lb.

Parliamentary News.

(By Our Special Parliamentary Reporter.)

Electricity in Rural Areas.

On July 23rd Mr. LAWTHER asked the Minister of Transport if he would make provision to secure, in any schemes of electrical development in rural areas, that the ascertained views of the inhabitants, as expressed by and through the local authorities, were given priority over commercial interests by cables being placed underground, thus preserving the beauty and amenities of the neighbourhood.

Mr. MORRISON said that before his consent was given under the Electricity (Supply) Acts to the erection of any electric line above ground, the local authorities concerned were entitled to be heard at a local inquiry if they so desired. Full consideration was given to their views in each case, but it was not possible for him to limit his freedom of action by laying down any such principle as that suggested.

London Tube Extensions.

On July 23rd Mr. MANDER inquired whether it was proposed to include in the Government schemes for finding work for the unemployed the extension of the Piccadilly Railway to Manor House and Southgate, and the extension of the Highgate Tube to East Finchley, and the number of persons to whom employment would thereby be given.

Mr. MORRISON replied that the Government did not propose to exclude from its consideration any useful scheme with regard to which assistance could be shown to be necessary. He had no information about the number of men who would be employed on the projects referred to.

Television.

On July 23rd Mr. LEES-SMITH, Postmaster-General, informed Major Church that he had received representations both from the Baird Television Development Co. and from the British Broadcasting Corporation concerning the facilities offered for

the use of a broadcasting station for experimental transmissions of television. He was considering those representations, but he was not yet in a position to state the result.

Railway Electrification.

On July 24th Major NATHAN asked the Minister of Transport whether, in connection with the Government's unemployment plans, steps would be taken to construct an electric railway from Liverpool Street, *via* Bethnal Green, to Leyton and Waltham Cross, and to Ilford and Hainault Forest.

Mr. MORRISON said that the railway companies had been asked to suggest schemes of development of this kind, but he was not yet in a position to say precisely what schemes were likely to be carried out.

On July 25th Mr. PALMER asked the Minister of Transport if he was in a position to say whether any representations had been made to him for the reconditioning of Fenchurch Street railway station and the railway to Southend-on-Sea; and whether any such proposal included electrification.

Mr. MORRISON said he had not received any recent representations on the matters referred to, but the L.M. & S. Railway Act of this year foreshadowed a scheme of improved railway communication between London and Southend in lieu of the electrification provided for in the Midland Railway Act, 1912.

A Cornish Scheme.

On July 24th Mr. FOOT asked the Minister of Transport if, in the electricity schemes now in prospect, any provision had been made for the supply of electricity to the village of Millbrook, near Plymouth, in the county of Cornwall, and, if so, could he state the extent of the intended provision and when the facilities were likely to become available.

Mr. MORRISON said he understood that an electricity scheme promoted by a local company made provision for a supply to Millbrook, where compulsory mains to the extent of about two-thirds of a mile were scheduled to be installed within two years. The Electricity Commissioners informed him that they hoped to be in a position shortly to make a Special Order in respect of that application, and submit it to him for confirmation.

Russian Export Credits.

On July 25th Mr. W. GRAHAM informed Mr. R. A. Taylor that, as part of the unemployment policy of the Government, it had been decided to permit the Advisory Committee under the Export Credits Guarantee Scheme, to consider applications in respect of trade with Russia as from August 1st.

Royal Assent.

The Royal Assent has been given to the Colonial Development Act; the Development (Loan Guarantees and Grants) Act; and the London Electric, Metropolitan District and City and South London Railway Companies' Act.

American Electricians in Great Britain.

On July 26th Commander BELLAIRS asked the Minister of Labour how many American electricians were working in Great Britain on permits; and what were the special circumstances held to justify this competition with British workers.

Miss BONDFIELD said she assumed that this question related to the entry of American electrical engineers who were concerned in the installation of sound film projecting apparatus in various kinema halls. The total number of such engineers was 81. The majority of the men were actively engaged in training British engineers, of whom the companies employed in all 239. The majority of the men in question had been allowed to land for short periods only, ending on September 30th next. She was advised that the apparatus to be installed was of a highly technical character, and that the number of British subjects competent to deal with it was at present inadequate.

Adjournment.

Parliament adjourned for the summer recess on Friday last week, and will reassemble on October 29th.

Correspondence.

***Correspondents should forward their communications* as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

The Battersea Power Station.

The London Power Company, Limited, has noted with regret the renewed attacks that have recently been made in the Press and elsewhere upon the Battersea power station, notwithstanding the assurances that have already been given on behalf of the company.

Unfortunately those from whom the attacks emanate have displayed no desire to ascertain the steps taken by the Power Company to fulfil its obligations and to meet the objections to the erection of the station. The Power Company desires to state in the most emphatic manner that its engineers and chemists have evolved a perfectly practicable and commercial solution of the "sulphur problem" in which they have complete confidence, and that the menace feared will be non-existent so far as the Battersea station is concerned. Letters patent have been applied for in connection with the process. The method and the results have been inspected by the Government chemists, and a full and complete report is about to be issued by the Power Company to the Electricity Commissioners.

W. F. Fladgate,
Chairman, LONDON POWER CO., LTD.

Westminster, S.W.1,
July 26th, 1929.

The E.S.C.A. and Whitleyism.

I was very interested to read a letter by "Non-Scriptus" in your issue of July 19th, but I cannot understand the sentence in which he says, "the Electricity Supply Commercial Association does not meet the case" to which he refers. The facts are as follows:—This Association represented the commercial and clerical staff on the National Joint Board on its formation, and continued to be members for about 18 months. The Association was forced to resign membership because the employers could not agree as a whole to continue to meet representatives of the commercial and clerical staff. In the opinion of some of them the National Joint Board was exclusive to the technical engineering staff, and I think the position was largely that employers generally did not appreciate the fact that in modern times even commercial and clerical staffs are able to organise in sufficient strength to be represented by an organisation that can adequately cater for their needs. The fact remains that the employer members of the National Joint Board in 1922 refused to continue to negotiate with the commercial and clerical staff through *any* organisation, and consequently rather than wreck the National Joint Board, and in deference to our colleagues in the E.P.E.A., this Association withdrew from the Board.

In the main I agree with your correspondent with regard to the importance of organisation in view of what may happen in consequence of the passing of the 1926 Act, but I should like to point out that this Association includes salesmen, showroom attendants, and other commercial grades in its membership.

Future representation before any responsible bodies of employers depends upon the strength of the organisation, and so long as large numbers of the grades to which your correspondent refers remain outside the organisation, so will its activities be hampered, and adequate representation delayed.

G. R. Smith,
General Secretary,
ELECTRICITY SUPPLY COMMERCIAL ASSOCIATION.

"Beaulieu," Bean Road, Bexley Heath.
July 24th, 1929.

Salesmanship.

We hear a great deal about the advantages of the trained salesman, trained in the knowledge of the commodity he is selling, not as some imagine in salesmanship only; but, unless we have trained buyers in our factories with knowledge of how the particular commodity, or material, is to be used and the processes which it has to go through, then the advantage of the trained salesman will be of no use, as he will be unable to convey to the untrained buyer the merits of the goods, as the latter will not understand.

I suggest that if we are to compete with up-to-date American enterprise we require both salesmen and buyers trained as much as possible in the particulars and uses of the commodities and materials which they respectively sell and buy.

Manufacturer.

July 25th, 1929.

Electromagnets on Ships.

A "Yes" or "No" answer cannot be given to Mr. P. Gargett's inquiry on behalf of Marine Traders, Ltd. The governing facts may be briefly stated:—The ship's compasses will be affected, but the degree may be inappreciably small. Two factors are involved: (1) the retentiveness of the materials, *i.e.*, the ship's plates and the iron pigs; (2) the arrangement of the iron pigs after being lifted and deposited by the electromagnet.

(1) The retentiveness depends upon the quality known technically as hysteresis, and may be described as the molecular friction which occurs in the material when it is magnetised. Mild steel generally, such as the ship's plates and rivets, approximates to wrought iron as regards permeability and retentiveness. It is highly permeable, *i.e.*, easily magnetised to a high degree, in virtue of which an electromagnet will hold on powerfully, but just as easily demagnetised, so much so that when the electromagnet is switched off and magnets removed, external magnetism practically disappears. Electromagnets have doubtless been used by the builders for holding-on drilling appliances in many parts of the ship, and the question of the ship's plates being magnetised by contact with the electromagnetic lifter or the pigs may be disposed of as being quite inappreciable and negligible.

Now, as regards the pig iron. Cast-iron generally is much less permeable than wrought bars, or mild-steel plates, &c.

It also has a higher degree of retentivity and, being magnetised to high degree locally where the lifting magnet is applied, will retain a certain amount—varying with various qualities of (pig) iron.

(2) If, therefore, all the pigs come off the lifting magnet the same way and are laid in the same order, *i.e.*, end to end, it is possible that the aggregate effect will be sufficient to disturb the compasses. If they are alternatively reversed end for end relatively to the way in which they have been in contact with the lifting magnet, they will form closed circuits among themselves, and external effects will be negligible.

Finally, the compasses should be observed as the ship is loaded and any movement noted, and the final displacement, if any, when loading is completed, taken into account during the voyage.

W. Brooks Sayers.

London, S.W.12.

The Inspection of Installations.

I, as an individual, have been rather interested in the articles which have appeared in your columns from time to time anent the National Register of Electrical Installation Contractors, and have a great amount of sympathy with its aims; also I consider that no intelligent body of persons would wish to sabotage any honest attempt to improve the standard of electrical work, but hope that before the N.R. bases false hope on the fulfilment of this project it will exercise circumspection and a due sense of proportion.

I noticed in one of the previous issues of the ELECTRICAL REVIEW that the committee asked for approval of a draft, setting forth certain points of bad workmanship, which rendered contractors liable to be struck off the roll. I paid particular attention to clause " (9) The employment of inadequately-paid labour, and the use of boys in unreasonable proportion to that of fully qualified wiremen." If the members of the N.R. are serious about raising the standard of workmanship, and working for the abolition of inferior material on jobs, then I venture to suggest—as a member of the E.T.U.—that the Electrical Trades Union could be of assistance to them, in helping them to eliminate from the N.R. the unscrupulous type of contractor, who accepts the benefits which membership of the N.R. may bring, but is not prepared to observe the obligations which membership of the N.R. imposes. It will be readily realised that the operative on the job has a better chance of detecting a breach of the rules, than probably anyone else. I have the temerity to suggest that some method might be adopted whereby local branches of the E.T.U. could be informed as to which employers in their area were members of the N.R.; then the Union, in the interests of all, could report any breach of the rules to the central body of the N.R. of E.I.C. for it to deal with.

D. MacKenzie.

Edinburgh.
July 26th, 1929.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken

1928.

204. "Radio-frequency amplifier." Hazeltine Corporation. September 26th, 1927. (297,723.)

216. "Selective amplifiers particularly suitable for wireless reception." A. H. Marks and P. Russell (legal representatives of E. C. R. Marks, deceased) (Veeeland Corporation). January 3rd, 1928. (314,884.)

3,438. "Arrangement for automatically modifying the relative amplitudes of signal currents." Siemens & Halske Akt. Ges. April 7th, 1927. (Patent of addition not granted.) (288,240.)

6,639. "Method of and apparatus for counteracting undesired magnetic fields." Pioneer Instrument Co., Inc. March 2nd, 1927. (286,277.)

6,727. "Excitation of continuous-current generators." Allmänna Svenska Elektriska Aktiebolaget. March 5th, 1927. (286,606.)

6,856. "Multiphase alternating-current rectifying systems." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). March 5th, 1928. (314,915.)

9,282. "Electrical gas lighters." L. Zwilling. March 27th, 1928. (314,773.)

9,332. "Current-supply control systems of electric furnaces and analogous electric heating installations." Birmingham Electric Furnaces, Ltd., and A. G. Lobley. March 28th, 1928. (314,774.)

9,333. "Electric furnaces." Birmingham Electric Furnaces, Ltd., and A. G. Lobley. March 28th, 1928. (314,775.)

9,632. "Electric circuit-breakers." Constructions Electriques de France. December 24th, 1927. (302,987.)

9,682. "Thermionic amplifier circuits." A. H. Marks and P. Russell (legal representatives of E. C. R. Marks, deceased) (Radio Frequency Laboratories, Inc.). March 30th, 1928. (314,921.)

9,872. "Protective arrangements for sectionalised electric power circuits." A. Reyrolle & Co., Ltd., E. W. M. Scott, and B. H. Leeson. April 2nd, 1928. (Cognate application, 23,716/28.) (314,778.)

9,874. "Electric headlamps for motor cycles and the like, and switching arrangements therefor." British Thomson-Houston Co., Ltd., L. Griffiths, C. J. Morton and T. H. Woodfield. April 2nd, 1928. (314,779.)

9,897. "Process for the control of electric current impulses for the purpose of remote picture transmission and of television or the like." O. Fulton. October 13th, 1927. (298,621.)

9,910. "Electric discharge tubes." S. G. S. Dicker. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). April 2nd, 1928. (314,925.)

9,918. "Sound amplifiers." P. H. Fuller. April 2nd, 1928. (314,889.)

9,921. "Contact plugs." Deltavis Co. October 26th, 1927. (299,416.)

9,922. "Contact plug for currents of great ampereage." Deltavis Co. January 13th, 1928. (303,873.)

9,989. "Electrical connecting plugs." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). April 3rd, 1928. (314,836.)

10,003. "Police control of electric lighting circuits of shops, banks, and the like." J. Neale. April 3rd, 1928. (314,837.)

10,014. "Electric terminals, bolts, and the like." W. E. Barber. April 3rd, 1928. (315,013.)

10,028. "Resistance elements for electrical heating apparatus." General Electric Co., Ltd., and C. W. Stopford. April 3rd, 1928. (314,839.)

10,172. "Dials for electrical condensers and the like." W. C. Tingey and Dubilier Condenser Co. (1925), Ltd. April 4th, 1928. (Cognate application, 26,387/28.) (315,014.)

10,216. "Electrical socket connections." W. E. Groves. April 4th, 1928. (Cognate applications 14,355/28 and 21,988/28.) (315,015.)

10,296. "Electrical reactance coils." J. A. Kuyser, A. G. Ellis and Associated Electrical Industries, Ltd. April 5th, 1928. (315,016.)

10,397. "Determination or measurement of voltage." J. E. Pollak (Hermsdorf-Schomburg-Isolatoren Ges.). April 5th, 1928. (314,929.)

10,413. "Speed-regulating systems." Electrical Research Products, Inc. January 25th, 1928. (304,712.)

10,430. "Electric couplings and method of making same." H. Baron (Compagnie Lorraine de Charbons pour l'Electricité). April 5th, 1928. (315,018.)

10,431. "Stator windings for alternating-current dynamo-electric machines." Ateliers de Constructions Electriques de Charleroi. October 29th, 1927. (299,694.)

11,677. "Electric resistances." British Thomson-Houston Co., Ltd. April 20th, 1927. (289,030.)

11,765. "Instruments for the measurement of alternating currents of any frequency." E. B. Moullin. April 21st, 1928. (315,029.)

13,158. "Variable coupling transformer." Brandes, Ltd. (Federal Telegraph Co.). May 4th, 1928. (315,039.)

13,230. "Electro-acoustic convertor, such as a loud speaker." B. S. Cohen. May 4th, 1928. (315,040.)

13,815. "Apparatus for electrically lighting a railway train from the turbo-dynamo carried by the locomotive and from a battery provided in one of the carriages." E. Aumuller. May 10th, 1927. (290,227.)

13,816. "Dynamo-electric machines." F. A. Eastwood and Associated Electrical Industries, Ltd. May 10th, 1928. (315,045.)

14,515. "Oil-break electric switchgear arrangements." J. G. Statter and G. S. Marston. May 17th, 1928. (Cognate application, 4,842/29.) (315,049.)

14,755. "Liquid rheostats or controllers." S. Gowan and Associated Electrical Industries, Ltd. May 19th, 1928. (315,052.)

15,277. "Electric condensers." British Thomson-Houston Co., Ltd. May 27th, 1927. (291,103.)

15,919. "Compensated asynchronous electric motors." Forges & Ateliers de Constructions Electriques de Jeumont. July 1st, 1927. (293,031.)

17,300. "Electric excess supply meters." Telefonaktiebolaget L. M. Ericsson. June 16th, 1927. (292,166.)

17,661. "Method and means for the illumination of a light-sensitive cell." J. Neale. June 19th, 1928. (Cognate application, 18,568/28.) (315,079.)

18,511. "Synchronous dynamo-electric machines and synchronous electric motors." English Electric Co., Ltd., and G. Schroeder. June 26th, 1928. (315,085.)

19,515. "Electric arc devices." P. Freedman. July 5th, 1928. (315,094.)

21,435. "Electric lampholders of the bayonet type, and like electric connections." P. Schmidmeier. July 24th, 1928. (315,106.)

21,506. "Sound-reproducing devices such as loud-speakers." I. S. Bobrovsky. July 24th, 1928. (315,109.)

22,428. "Electric switches." H. Hope & Sons, Ltd., and D. G. Page. August 2nd, 1928. (315,116.)

24,190. "Illuminating devices." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. May 26th, 1928. (312,333.)

24,628. "Electric switches." G. Schapringer. November 2nd, 1927. (299,841.)

25,005. "Electric irons." Chesterton, Jones & Co., Ltd., and F. F. D. Davidson. August 31st, 1928. (315,136.)

25,394. "Loud-speakers." Ideal Werke Akt. Ges. für Drahtlose Telephonie. September 4th, 1928. (Addition to 309,067.) (315,140.)

27,116. "Methods of protecting electric equipments." British Thomson-Houston Co., Ltd. September 21st, 1927. (297,436.)

31,235. "Incandescent electric lamps having means for giving different degrees of luminous intensity." G. de Gasenko. March 31st, 1928. (Addition to 291,372.) (308,765.)

31,800. "Self-contained rural transformer sub-stations." Condit Electrical Manufacturing Corporation. February 6th, 1928. (305,525.)

33,472. "Transformers." British Thomson-Houston Co., Ltd. November 15th, 1927. (300,568.)

34,028. "Electric motors." E. D. Feldman. November 20th, 1928. (Addition to 312,885.) (315,175.)

34,519. "High-tension conductors." Metallges. Akt. Ges. and J. Zagorski. November 23rd, 1928. (315,179.)

35,935. "Electric hand signal lamp." H. Schrönecker. December 6th, 1928. (315,183.)

1929.

6,761. "Electro-magnetic reciprocating motors." A. E. White (Central Electric Tool Co.). April 13th, 1928. (Divided application on 293,685.) (315,191.)

15,936. "Magnetostrictive vibratory systems and apparatus for use in subaqueous and other signalling systems." G. W. Pierce. January 3rd, 1928. (Divided application on 283,116.) (314,891)

16,309. "Electric switches." General Electric Co., Ltd., and E. H. Croft. April 12th, 1928. (Divided application on 10,792/28.) (315,194.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from July 24th :—

Peel-Conner. No. 485,795. Class 6. Magnetic-electric machines and parts thereof. No. 485,796. Class 8. Telephonic instruments and apparatus and parts thereof.—General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.

Majestic (lettering and design). No. 495,573. Class 8. Sound-amplifying apparatus and parts thereof, amplifying and rectifying tubes or valves, radio-telephonic apparatus and parts thereof.—Grigsby-Grunow Co., Chicago. (British representatives: White, Langner, Stevens, Parry & Rollinson, Jessel Chambers, 88-90, Chancery Lane, W.C.2.)

Sampson Accumulators, Goltone Product (lettering and design). No. 501,481. Class 8. Electric accumulators (not for medical purposes).—Ward & Goldstone, Ltd., Pendleton, Manchester.

Bi-Latrola. No. 502,038. Class 8. Loud-speakers for use in radio-telephony and electrical sound-reproducing instruments and apparatus.—Ottomar Voelk, Berlin. (British representatives: A. M. & W. Clark, 53,54, Chancery Lane, W.C.2.)

Truvox, the new method of perfect reproduction (lettering and design). No. 502,533. Class 8. Radio receiving sets, loud-speakers, &c.—Universal Gramophone & Radio Co., Ltd., Ryland Road, Kentish Town, N.W.5.

Telelogoscope. No. 503,930. Class 8. Apparatus for use in transmitting and displaying messages, characters, views, scenes, or images to a distance by telegraphy or telephony.—Baird Television Development Co., Ltd., 133, Long Acre, W.C.2.

K.L.G. (lettering and design). No. 495,923. Class 13. Sparking plugs, waterproof terminals, and sparking plug accessories.—K.L.G. Sparking Plugs, Ltd., Robinhood Engineering Works, Putney Vale, S.W.15.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ALLESTREE (Derby).—Electric lighting installation, Parish Church; Rev. W. Greenhalgh, vicar.

ALTRINCHAM.—School, for the E.C.; clerk.

ASHFORD (Kent).—Re-erection, business premises, High Street, for Millar & Jarvis.

BAKEWELL.—Offices, for R.D.C. (£7,580); E. M. Longsdon, architect.

BANSTEAD.—School, Tadworth, for Surrey E.C.; W. W. Finny, secretary, Kingston-on-Thames. Houses (86), Glenfield estate, for Charles Lewin.

BARNSLEY.—Infant welfare centre and clinic, for the T.C.; borough engineer.

BEXHILL.—Alterations, Castle Hotel, Buckhurst Place; H. Ward, Son & Wray.

BIRKENHEAD.—School, Gautby Road (£10,204), for the Borough E.C.

BLACKBURN.—Additions to works at Daisyfield, for British Northrop Loom Co., Ltd.; builders, J. Gerrard & Sons, Ltd., Swinton, Manchester.

BLANDFORD. — Secondary school (£20,000), for the governors; clerk.

BOURNEMOUTH.—Junior school, Ensbury Park, for Dorset E.C.; H. E. Matthews, county architect, Dorchester.

BRADFORD.—Erection of shops and offices, Leeds Road, Bridge Street, and Hall Ings; city architect. Tenders to N. L. Fleming, town clerk, Town Hall, by August 10th.

BRENTFORD.—Alterations and additions, Court House (£20,000); Middlesex C.C.

BRIERFIELD.—School; director of education, County Education Offices, Preston.

BRIGHTON.—Estate development, Peacock Lane, Patcham; G. W. Warr, for Kenneth Loader. 30 houses, Rottingdean; borough engineer.

BROMLEY (Kent).—Nurses' home, Farnborough Institution (£15,000), for the Board of Guardians; Danby Smith, architect.

CARLISLE.—Additional 250 houses, Newtown, for the T.C.; city surveyor. Technical school, for the borough E.C.; director of education.

CARSHALTON.—Houses; A. E. Wilkinson, Ltd. (20); Nibloc Syndicate (20).

COVENTRY.—School, Green Lane, for the borough E.C; director of education.

CUDDINGTON.—School, Cheam, for Surrey E.C.; W. W. Finny, secretary, Kingston-on-Thames.

EPSOM.—Houses (250), for the Allied Building Corporation.

FARNHAM (Dorset).—School, for Dorset E.C.; H. E. Matthews, county architect, Dorchester.

FRANKBY (Wirral).—Re-erection of mansion, for E. B. Royden; J. A. Milestone & Son, builders, Wallasey.

HANLEY.—Shops and offices, High Street; Stoke-on-Trent city engineer. 42 houses, Etruria Vale estate (£17,660); Ball & Robinson, Stoke-on-Trent.

HAYES.—School (400 places); Middlesex E.C. Extensions, factory, Clayton Road; Gramophone Co., Ltd.

IRISH FREE STATE (Cork).—44 houses at Douglas Road, for the Irish Sailors' and Soldiers' Trust; W. J. Brown, architect, 50-51, Upper Mount Street, Dublin (returnable deposit £5 5s.).

(Charleville, Co. Cork).—Housing scheme (35), for the Cork County Board of Health; W. H. Bolster, architect, Kanturk, Co. Cork.

IRVINE.—Extensions, Royal Academy, with electrical and heating work, for Ayrshire E.C.; William Reid, Education Offices, Ayr.

KINGSWINFORD.—Housing scheme (24), Pensnett, for the R.D.C.; W. Meredith, surveyor, Worsley, Stourbridge (returnable deposit of £2 2s.).

LEITH.—Town hall and library (£75,000); borough surveyor.

LEXDEN AND WINSTREE (Essex).—Housing scheme (30), for the R.D.C.; surveyor.

LIVERPOOL.—School, Norris Green (£20,000), for Father Sargent; Foden, Heron & Williams, 36, Dale Street.

LONDON (Ilford, E.).—Public baths (£51,669); E. A. Russell, contractor, for Corporation. School, Goodmayes, for the borough E.C.; H. Shaw, architect, Town Hall (returnable deposit of £1 1s.). Premises, for the John Bodger Store, Ltd., Station Road; W. D. Key. Shops and store, Ley Street and Clifton Road; W. J. Lewis, architect.

LONDON—(*continued*).

(E.C.).—Rebuilding police station, Old Jewry (£34,634); Higgs & Hill, Ltd.

(Crouch End, N.).—Municipal offices; Hornsey Corporation.

(Tottenham, N.).—Accommodation for 88 nurses, North Eastern Hospital; Metropolitan Asylums Board.

(Finsbury, N.).—Extensions, Northern Polytechnic, St. John Street (£35,000); governors.

(Hampstead, N.W.).—Reconstruction, North Western Hospital (£111,246); Paine & Hobday, architects for M.A.B.

(St. Marylebone, N.W.).—Seven blocks of dwellings, Carlisle Street area (£175,000); L.C.C.

(Forest Hill, S.E.).—Boys' secondary school (450 places); L.C.C. architects' department.

(Woolwich, S.E.).—School, Eltham housing estate, for the London E.C.

(Wandsworth, S.W.).—Reconstruction of Plain area and erection of tenements and shops (£190,000); borough engineer.

(Wimbledon, S.W.).—Additions, Wimbledon Hill Hotel, High Street; R. J. & J. S. Thomson. School, for Holy Cross Convent, Southey Road; L. H. Shattock.

(Westminster, S.W.).—Buildings, Dorchester House site, Park Lane; Newes & Davis. Improvements, electric lighting, at St. Martin's School of Art; L.C.C. chief engineer. Adapting premises in Great George Street for County offices (£12,300); Middlesex county architect.

(Strand, W.C.).—Buildings, island site, Trafalgar Square; J. Murray.

MANCHESTER.—Premises, Stretford Road and Medlock Street, for Montague Burton, Ltd., Leeds; H. Wilson, 81, North Lane, Leeds. Factory, with electrical equipment, for I. Freedland, Church Street, Cheetham; Halliday & Agate, John Dalton Street.

NORTHAMPTON.—Additional 28 houses, St. David's estate, for the T.C.; borough surveyor.

NORTHWICH.—Schools; clerk to the area Education Sub-Committee.

PRESTON.—Extensions, county offices; Lancs. county architect

PORTSMOUTH.—Erection Northern Secondary School (£114,942); Rowland Bros., Horsham. Alterations, Westminster Bank, Osborne Road; F. J. Privett. Alterations and additions, Majestic Cinema; R. W. C. Stocks. Alterations, Albert Road; Apollo Kinematic Theatre (Southsea), Ltd. Warehouses, Cressey Place; Brunswick Dyeing and Cleaning Co., Ltd.

RADCLIFFE (Lancs.).—Central school, Peel Park, for the E.C.; clerk.

REDHILL.—Factory, for Rubeck, Thew & Co., 16, Mincing Lane, London, E.C.

RUISLIP.—School (300 places); Middlesex E.C.

SALFORD.—Senior school, Mount Carmel, for the borough E.C.; education architect.

SHIPLEY.—Extensions, works, Dockfield Road; Bradford Gas Engine Co., Ltd. Extensions, Canal Iron Works, Lower Wharf Street; J. Parkinson & Son.

SKEGNESS.—Housing scheme; surveyor to U.D.C.

STOKE-ON-TRENT.—106 houses, Lodge estate; Sutton Trustees.

SUTTON.—Nurses' home, Downs Hospital (£49,530); Metropolitan Asylums Board.

SWALLOWFIELD (Reading).—Re-erection of works, Walden and Co., Ltd. (£16,000).

THORNE.—Cinema, Marshland Road, Moorend; T. H. Johnson, architect, Priory Place, Doncaster.

TYNEMOUTH.—52 flats, Balkwell estate; borough engineer.

VERWOOD.—School, for Dorset E.C ; C. G. Bone, director of education, Dorchester.

WARLINGHAM.—Extensions (100 beds), mental hospital; Croydon borough engineer.

WOKING.—School (192 places), Westfield, for Surrey E.C.; W. W. Finny, secretary, Kingston-on-Thames.

WRIGHTINGTON. — Tuberculosis hospital (£115,000); Lancs. C.C.

YIEWSLEY.—School (350 places); Middlesex E.C.

YORK.—Additional 160 houses, for the T.C.; F. W. Spurr, city engineer. Development, Kilburn estate; Harrowell and Agar. Alterations, James Street; British Petroleum Co., Ltd. Premises, Tang Hall Lane; York Equitable Industrial Society, Ltd.